# THE AEROPLANE and ASTRONAUTICS

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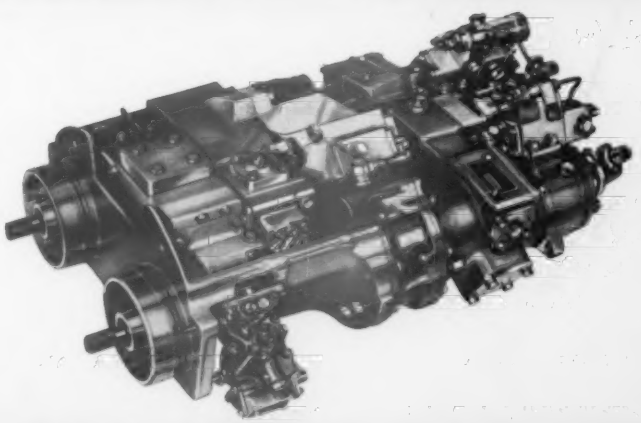

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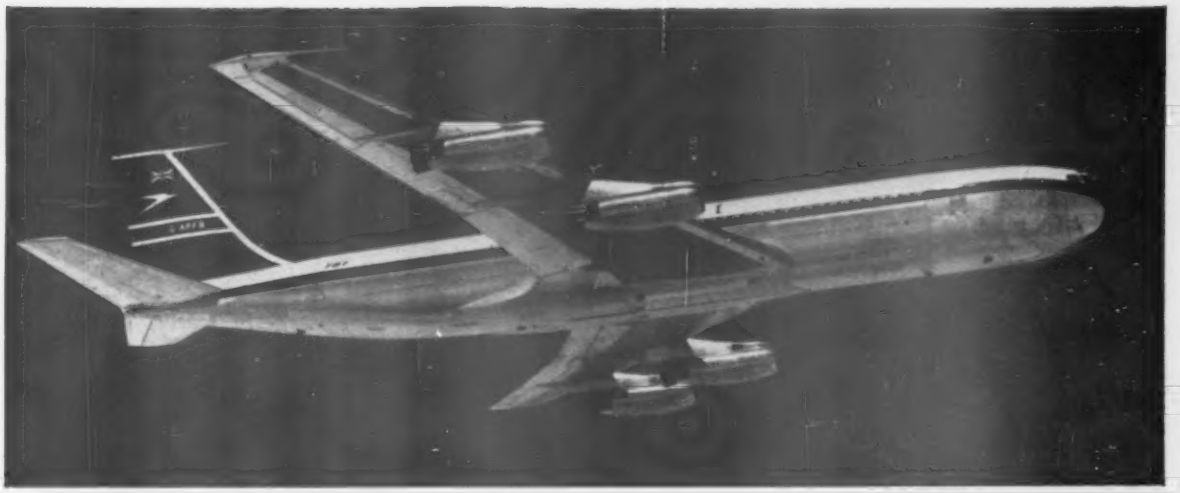
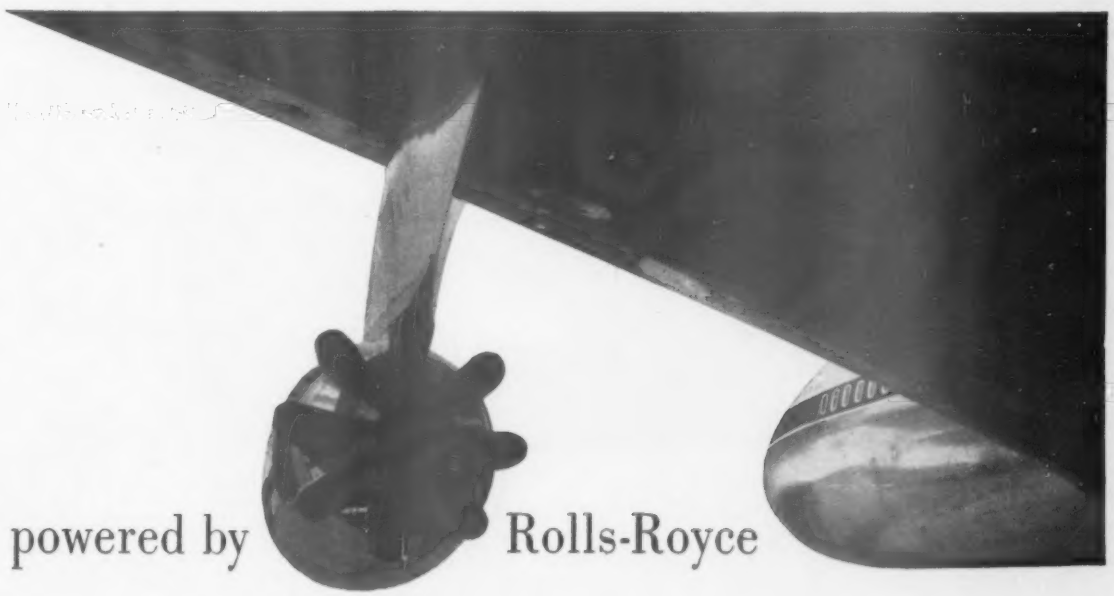


# B.O.A.C.'s new 707 Intercontinental...



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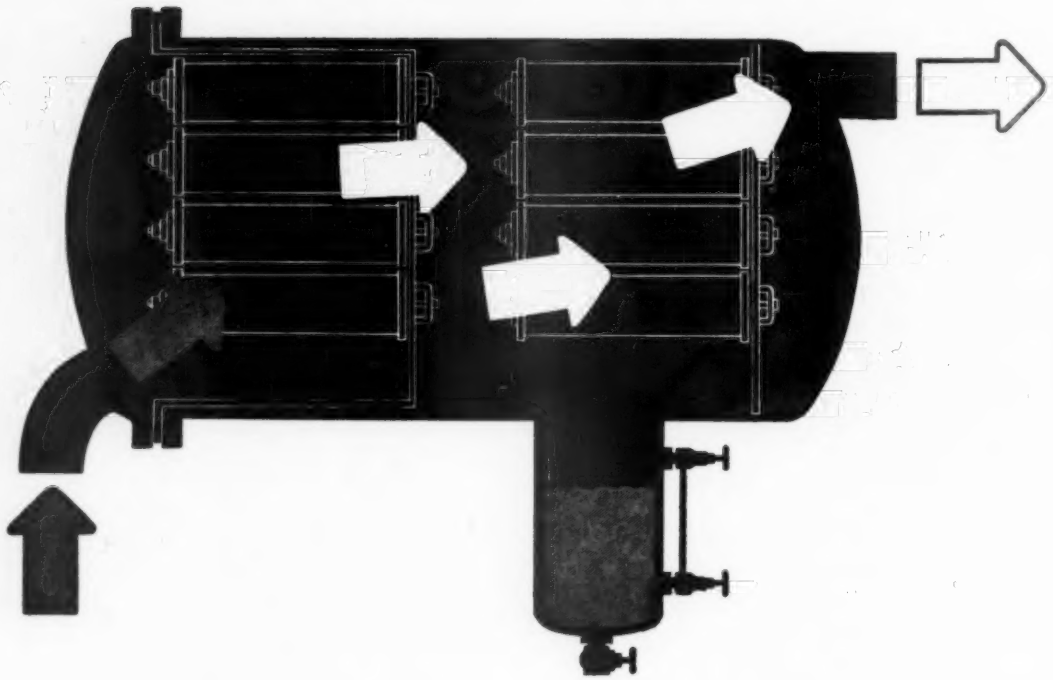

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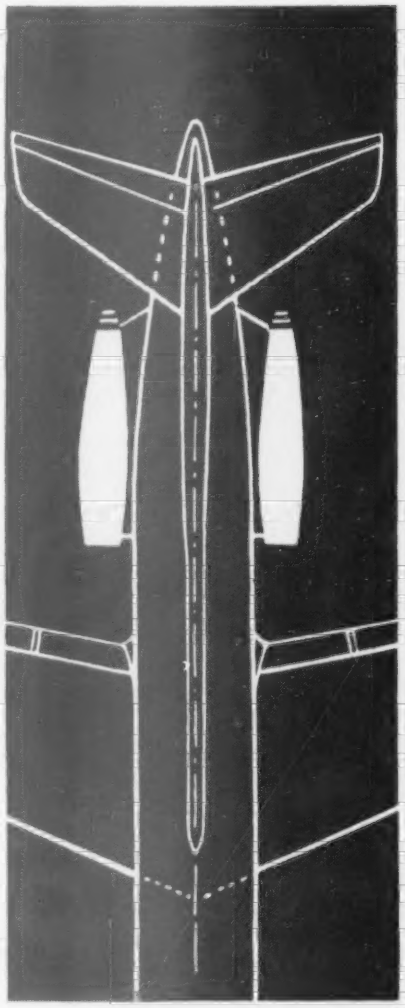

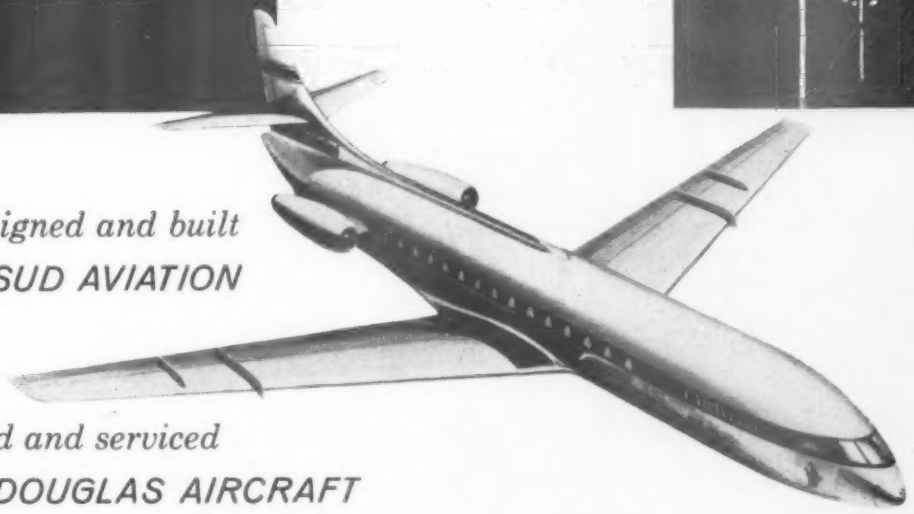

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THE AEROPLANE and ASTRONAUTICS

VOLUME 99 NUMBER 2553 SEPTEMBER 23, 1960

# Handing on the Torch

Londoners in their tens of thousands flocked to Biggin Hill's At Home on Battle of Britain Saturday last week. Indeed the official figures confirm that the attendance there was some 5% greater this year than last. On the whole, however, despite the greater publicity given in view of this year's being the twentieth anniversary, the overall figures throughout the country were down on last year.

The attendance at Biggin Hill shows that a worth-while flying display in the hands of the Royal Air Force remains a great draw. This public attitude is made clear by the tremendous attendances over the week-end for the last two days of the S.B.A.C. Show (Saturday 100,000 minus and Sunday 100,000 plus). For though it will be a year or two before the R.A.F. can show anything to compare with the Short SC-1 it was not only the presence of this machine and the new products of the Aircraft Industry which drew the crowds, the contribution by the R.A.F. teams played no small part in catching their enthusiasm.

It is indeed right and proper that the public should have an opportunity to see with what equipment the Royal Air Force is furnished and, in addition, the devoted skill with which this equipment is used. It is indeed right and proper that ceremonies in our cathedrals and churches and at local war memorials should remind the people of how much they owed to the gallantry of the pilots in 1940.

What is much more difficult to put over is how much was owed to those in the back rooms who foresaw the need for the 8-gun fighter and those who brought the whole science of radiolocation into being. It is not only that honour is due to the men who were responsible for these developments; there is a need today for us to assure ourselves that however arduous the way, the eyes of those who guide us are indeed fixed on the stars. The young men of other nations are getting ready to launch themselves into space; we have yet to hear of any plans for those in this country to do likewise. In honouring the dead who died that we might be free, we must not fail to remember our duty to those who come after.

# Pressing on with Air Transport

Apart from the ever-present subject of rates for passenger fares, the matters which may well be said to have overshadowed the others at the discussions during the course of the IATA Annual General Meeting at Copenhagen last week were two that seldom remain unmentioned in our pages; first, the problem of how to reorganize the handling of passengers on the ground so that the gains in block-to-block speeds by air shall not be nullified; second, the advent of the supersonic airliner.

As regards the advent of supersonic transports, IATA has decided to organize, in Montreal early next year (April), a special conference devoted solely to the various aspects. It is with no intention of hastening the introduction of these machines that the meeting has been called. Through its Technical Committee the Association is determined to find out what are the problems imposed by travel at such speeds. The answers sought concern such matters as range, air traffic control and noise. The last-mentioned is, as operators are fully aware, a problem that is already with them. It is generally felt that this nuisance cannot be ignored nor discussion of it related solely to its creation by supersonic airliners.

What with this subject and the enthusiasm of many manufacturers to get into the supersonic transport business, IATA's Technical Conference should certainly bring in the Spring in a big way.

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# *Matters of Moment*

MORE FOR THE COMMONWEALTH.—East African Airways—the first Commonwealth airline outside Britain to buy Comet 4s—inaugurated Comet services on Sept. 17, between London, Rome, Khartoum, Entebbe and Nairobi. Three services a week are being operated, with extensions to Dar-es-Salaam and Johannesburg.

## Skybolt Round-up

EIGHT days of Anglo-American talks about the use of the Skybolt ALBM by the R.A.F. ended on Wednesday (Sept. 21) at Wright Air Development Division in Dayton, Ohio. This joint planning conference was attended by 30 representatives of the Air Ministry and Ministry of Aviation as well as by Avro personnel and members of the British Defence Staff based at Washington. Prior to their arrival at W.A.D.D. in an R.A.F. Comet, they had visited the Douglas plant at Santa Monica to inspect the mock-up of the missile and its attachment pylon.

Five planning sub-committees met simultaneously to discuss missile testing, crew training, ground service equipment, logistics and development of the Skybolt system for the Royal Air Force.

The news release giving this information stated that Skybolt was "the first U.S.A.F. solid-propellent two-stage ALBM" and that it would be carried by B-52s and V-bombers. It can be launched, the statement went on, "at any altitude at ground targets up to 1,000 miles away and it is designed to deliver a wide range of nuclear warheads."

Inclusion of Avro personnel in the visitors to Dayton suggests that the decision to equip our V-bombers with Skybolt is related so far to the Vulcan alone. The final decision regarding the Victor in this respect has yet to be taken.

Latest Washington news on Skybolt deliveries is that the first operational missiles should be received by the U.S.A.F. in 1964 with deliveries to the R.A.F. in 1965. Despite reports to the contrary, the U.S.A.F. maintains that the programme is on schedule. In fact, it may well be that some target dates will not be achieved, but there is flexibility in the overall programme and it is almost certain that operational missiles will be delivered on schedule. Some development stages may stretch but others will probably be shorter than programmed. The excellent Douglas record on the Thor programme should not be forgotten.

Incidentally, Gen. Thomas White, the U.S.A.F. Chief of Staff, has been misleadingly quoted as saying that Skybolt might not be in service until 1968. He was actually referring to the worst possible date at which all units would be equipped with the missile. He said that, depending on the rate of development, re-equipment with Skybolts would be completed by 1966 at best and 1968 at the worst.—J.R.C.

## The Twentieth Anniversary

TOTAL attendance at last Saturday's Battle of Britain air displays organized at the 25 R.A.F. stations "At Home" to the public was estimated by the Air Ministry at approximately 750,000. At Biggin Hill about 180,000 people, 10,000 more than in 1959, saw the largest display of the day.

Compared with last year, when approximately 1,150,000 members of the public visited 31 Service stations, the overall figure was down. This drop in attendance could have been caused by two factors, the smaller number of stations open compared with 1959 and the indifferent weather in many parts of the country, especially during the morning.

In addition to the air displays there were the annual service of Thanksgiving in Westminster Abbey on Sunday and the parade on, and fly-past over, Horse Guards Parade. Her Majesty The Queen was represented by Air Marshal Sir Theodore McEvoy.

COMMEMORATING THE FEW.—Among the solemn ceremonies held last week-end in remembrance of the Battle of Britain was a march-past of present and past members of the R.A.F. and W.R.A.F. on Horse Guards Parade. Air Chief Marshal Lord Dowding took the salute.

*Photographs copyright "The Aeroplane and Astronautics"*

## Aeroflot For IATA?

SIR HUDSON FYSH, K.B.E., D.F.C., chairman of Qantas Empire Airways, was last week elected president of IATA from September, 1961, in succession to Mr. Ake Rusck, the 1960-61 president of the Association. With next year's IATA A.G.M. being held in Sydney, this election was to be expected and Qantas will be hosts for the meeting. The 1962 meeting is to be held in Dublin, with Aer Lingus as the host airline.

The chairman of B.O.A.C., Sir Matthew Slattery, was elected to fill the unexpired one-year term of Sir Gerard d'Erlanger on the IATA executive committee. The impending change of K.L.M. presidency was forecast by the election of Mr. E. H. van der Beugel to this committee in place of Gen. I. A. Aler.

During a Press conference at the end of the Copenhagen meeting Sir William Hildred, the Association's director-general, said that there was a possibility that Aeroflot might eventually "have links" with the Association. He had held, he said, very friendly talks with Gen. E. F. Loginov, chief of U.S.S.R. civil aviation, earlier this year.

## To Direct N.G.T.E.

FROM the Ministry of Aviation comes news that Mr. R. H. Weir, C.B., B.Sc., F.R.Ae.S., has been appointed director of the National Gas Turbine Establishment at Pyestock to succeed Mr. H. Constant, C.B., C.B.E., M.A., F.R.Ae.S., M.I.Mech.E., F.R.S., who became scientific adviser to the Air Ministry on Sept. 1. Mr. Weir has been director-general of engine research and development at the Ministry of Aviation (and before that at the Ministry of Supply) since 1952, and takes to his new appointment a wide knowledge of powerplant technology and the powerplant industry.

Born in 1912, and educated at Allan Glen's School and Glasgow University, he has had a long and distinguished career as an engineer. After serving his apprenticeship with Wm. Denny and Bros., Ltd., at Dumbarton from 1928 to 1933 he became a technical assistant at R.A.E., Farnborough. Six years later he transferred to the Air Ministry as a technical officer and in 1940 went to A. and A.E.E. as a senior technical officer.

In 1942 he was moved to the then M.A.P. in a similar capacity and in 1944 became a principal technical officer at the Ministry. Three years later Mr. Weir became a principal scientific officer at M.o.S. and in 1949 was appointed assistant director. The following year he became director of industrial gas turbines at the Ministry and in 1952 was appointed director-general of engine research and development.

## Scientists at Zürich

FIRST report from our correspondent at Zürich shows that five hundred scientists from many nations attended the Second International Congress of the Aeronautical Sciences which opened in that Swiss city on Sept. 12. The Congress closed four days later.

Both America and Russia were strongly represented, and in addition to delegates from Great Britain and Europe, a surprisingly large number of delegates represented Japan, indicating the revival of interest in aeronautics by the Japanese aircraft industry.

The opening address was made by the founder and Honorary President of the Congress, Dr. Theodore von Kármán. He also introduced Dr. Jacob Ackeret, who gave the Daniel and Florence Guggenheim Memorial Lecture entitled, "The Role of Entropy in the Aero/Space Sciences." The paper was concerned with the kinetic heating and thermodynamics of flying vehicles, including the re-entry problems of future space craft.

For this purpose, Dr. Ackeret introduced the concept of Entropy, and proceeded to give an interesting lecture, which covered many of the thermodynamic developments since the original conception by Clausius, nearly one hundred years ago, to the present day. In addition to kinetic heating, problems of shock waves, jet-engine efficiency and space-flight propulsion were also discussed.

Great Britain was represented by many papers which were obviously of great interest to the Congress. The main British contribution was in the field of aerodynamics, where a number of authors contributed papers on the aerodynamics of transonic and supersonic aircraft.

Special mention should be made of the papers presented by Dr. Küchemann of the Royal Aircraft Establishment, Farnborough, and by Dr. Lock and Dr. Pearcey, of the National Physical Laboratory, Teddington. Their papers were concerned with the aerodynamic shape of future supersonic transport aircraft.

In addition to aerodynamics, many other aspects of aeronautical science were adequately covered. These included recent researches into materials and structures, propulsion, space-flight and air transport.

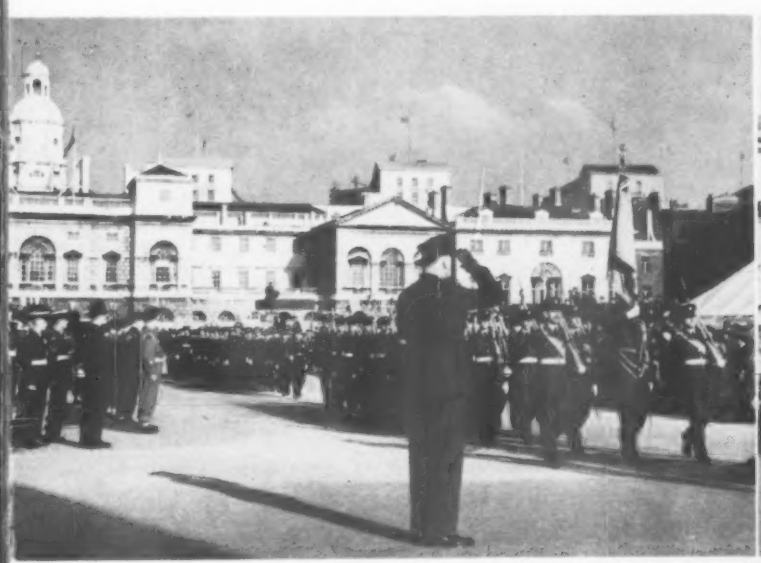
One particularly interesting paper was in the air transport section. In this the Japanese gave details of the present position of their aircraft industry. In addition, details were given of a new Japanese Y.S.II. transport aircraft, with two Rolls-Royce Darts, which carries between fifty and sixty passengers. Two aircraft are due to fly towards the end of the year.

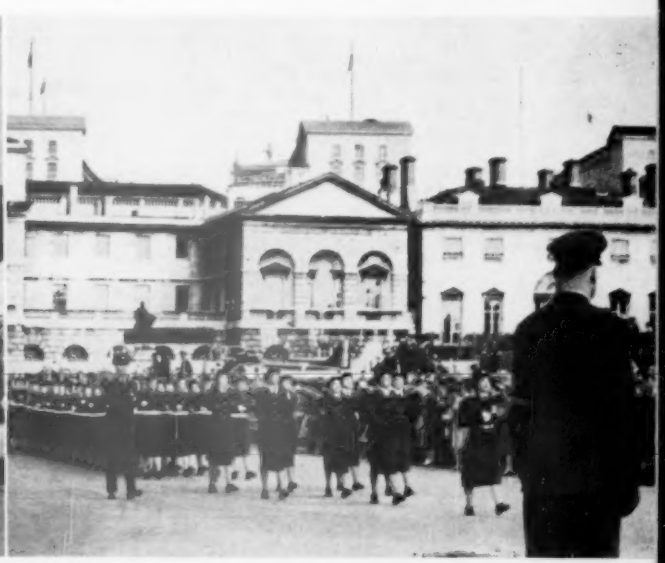
The field of space travel was not neglected and British, American and Russian authors contributed a number of important papers.—D.S.H.

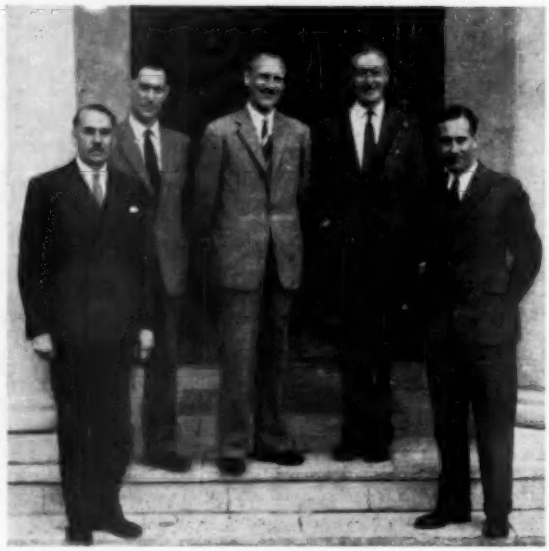
## Discussing the Space Programme

EXPLORATORY talks on the subject of a possible space-research programme based at Woomera began on a ministerial level in Canberra recently when Mr. Peter Thorneycroft, Minister for Aviation, opened discussions with the Australian Prime Minister, Mr. Menzies; the Minister for Defence, Mr. Townley; and the Minister for Supply, Mr. Hulme.

At a Press conference shortly after his arrival in Sydney on Sept. 12, Mr. Thorneycroft said the discussions would also concern possible co-operation between Commonwealth and Western European countries in a satellite launching programme. He emphasized that Britain had no intention of competing with the United States and Russia in launching manned vehicles. The combination of Blue Streak and Black Knight with a third







FLYING TRAINERS.—As recorded on page 441, the new College of Air Training opened at Hamble on Sept. 15. Senior staff members are (left to right) Mr. H. Bromage, Bursar; Sqn. Ldr. G. C. Webb, C.F.I.; A.V.M. E. C. Bates, Principal; Sqn. Ldr. C. N. Hoy, C.G.I.; and Mr. R. E. M. Hughes, Director of Studies.

stage to place in orbit satellites possessing a variety of scientific applications, was being considered. He thought such satellites could make an important contribution in the fields of communications, navigation and meteorology.

Mr. Thorneycroft pointed out that the cost of a satellite programme would be substantial both in money and resources, and the benefit difficult to assess precisely. The British Government did not wish to reach any conclusions on its space-programme until there had been a full exchange of views with Australian Ministers.

## Recovery of Sputnik V

DESPITE the fact that thousands of words describing the "Second Soviet Spaceship" (Sputnik V), have now appeared in the Soviet Press, there is still a great deal of uncertainty concerning the devices of recovery. The following is a summary of the relevant part of the Soviet statement.

After the spaceship had been placed in the prescribed orbit, it separated from the last stage of the carrier rocket. The orientation system guided the ship while in orbit and during its descent. Ground stations in the U.S.S.R. kept the vehicle under observation and tracking information was automatically transmitted to computing centres for processing.

Precise knowledge of the orbital parameters was essential for a landing within the prescribed "margin of error" and it was necessary to select the proper time for switching on the retro-rocket. An error of only one metre a second would have deflected the vehicle over 30 miles. An error of about 300 ft. in estimating the height would have meant a deflection of nearly three miles; and an error of one minute of arc in attitude would have resulted in a deflection of 30 to 40 miles.

On its 18th orbit, the spaceship was commanded to descend in the prescribed area, its speed being suitably reduced by the retro-rocket. To minimize the *g*-forces arising when the vehicle re-entered the atmosphere a long descent path was adopted.

After the vehicle had passed into its descent trajectory, the instrument compartment was ejected and burned up as it entered the atmosphere. It contained a radio-telemeter; guiding apparatus; part of the scientific payload, including instruments for studying cosmic rays and short waves emitted by the Sun; heat-regulation apparatus; and a retro-rocket.

Attached to the outside of the space-vehicle itself were "rudder nozzles" and the orientation system's reserve high-pressure gas containers, transducers for the scientific apparatus, radio aerials, solar batteries, and also "a system of heat insulation to prevent the ship from burning up during its descent."

During its descent, the vehicle was slowed down in the atmosphere by a "special decelerating system." When the vehicle had descended to about 23,000 ft., it had travelled nearly 7,000 miles. Between 23,000 ft. and 26,000 ft., the "cap of the ejection trap" was jettisoned by barometric relays and the animal container was ejected. The container landed at a speed of 20 to 26 ft./sec. and the space-vehicle at nearly 33 ft./sec.

Immediately separation occurred, radar stations tracked the animal container and spaceship to their respective landing points. The two-part recovery was described as an "emergency procedure" put into effect to test the system for future manned flights. Safe recovery, Russian scientists said, would have been possible if the animals "had remained in the spaceship instead of being catapulted out in their pressurized cabin." It seems reasonable to assume that the recovery technique would also be effective in separating the cabin from the launching rocket if a failure occurred after take-off.

A photograph of the animal container and a drawing outlining its principal features were published last week.—K.W.G.

## The Military Argosy

DETAILS and performance data have now been released of the military Argosy, the A.W.660. It was confirmed last week that the R.A.F. has adopted the maker's name for the 56 aircraft of this type now on order for Transport Command; they will be known as Argosy C.Mk.1s. The data printed below apply to the military A.W.660 in general, but are not necessarily applicable to the R.A.F. version.

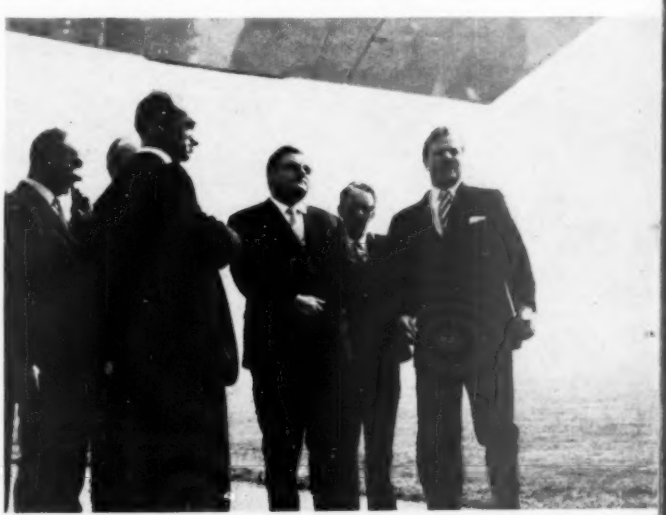
Basically, the A.W.660 is intended as a military freighter, for which purpose it has a fuselage capacity of 3,680 cu. ft. Dimensions of the main hold are 46 ft. 10¼ in. by 10 ft. by 6 ft. 8 in. increasing to 8 ft. 6 in. over the rear 14 ft. Nose-loading doors are optional; the rear-loading crocodile-jaw doors provide an opening 8 ft. 8 in. by 8 ft. 6 in. and the lower jaw forms part of an integral loading ramp. Up to 29,000 lb. in freight can be carried. For air-dropping of equipment and supplies, two medium platforms can be accommodated, each with a maximum load of 14,000 lb., and are extracted from the aircraft using pendulum-type parachutes. A series of one-ton containers can be carried alternatively.

Other roles suggested for the A.W.660 are paratrooping, with 69 fully equipped troops; V.I.P. and personnel transport; mobile headquarters; and casualty evacuation with up to 48 stretchers and medical attendants. A wide variety of guided missiles can be carried by the A.W.660, including the Mace, Corporal, Nike-Hercules, Honest John, Hound Dog, Sergeant, Lacrosse, Bloodhound and Seaslug.

The A.W.660 is powered by Rolls-Royce Dart R.Da.8s—military versions of the civil R.Da.10 rated at over 3,000 e.h.p. Standard provision is made for in-flight refuelling, with a probe above the flight-deck and the fuel line routed outside the pressurized areas and entering the aircraft at the leading edge.

**Weights:** Total structure, 31,300 lb.; power units, 8,683 lb.; fuel supplies, 1,612 lb.; power services, 5,008 lb.; furnishings and equipment, 7,867 lb.; service items, 810 lb.; crew, 720 lb.; basic weight, 56,000 lb.; max. t.o. weight, 97,000 lb.; max. landing weight, 90,000 lb.; zero fuel weight, 85,000 lb.; max. payload, 29,000 lb.; capacity fuel load, 33,280 lb.

**Performance:** Average cruise speed, 233 knots at 80,000 lb. at 20,000 ft. in I.S.A.; take-off field length required at sea level at



PERSONAL INSPECTION.—Recently a distinguished visitor to Dunsfold was Herr Strauss, the West German Defence Minister, where he saw the Hawker P.1127 prototype. While there he examined the Blackburn Buccaneer and here (L. to R.) Capt. E. D. G. Lewin, Mr. N. E. Rowe, Herr Strauss, Major Vallance and Mr. Derek Whitehead are seen at the wing-tip.

Photographs copyright "The Aeroplane and Astronautics"

FORTY YEARS ON.—This week-end the de Havilland Aircraft Co. celebrates its 40th birthday having come into being on Sept. 25, 1920, as recounted at length in our issue for Aug. 26. Top, those who played an active part in its formative years were: left to right, Sir Geoffrey de Havilland, Mr. W. E. Nixon, Mr. F. T. Hearle, Mr. C. C. Walker, Sir Alan Cobham, Mr. A. E. Hagg and Capt. H. S. Broad. Bottom, a 1923 de Havilland aeroplane the D.H.53, Humming Bird, was recently rebuilt by the company's students.

max. weight, 4,800 ft. in I.S.A. and 5,400 ft. in I.S.A. +20°C.; minimum all-engines operating take-off distance at sea level at max. weight, 3,260 ft. in I.S.A. and 3,600 ft. in I.S.A. +20°C.; approach speed, 113 knots; landing distance from 50 ft., at sea level, max. weight on wet concrete, 3,020 ft. in I.S.A. and 3,220 ft. in I.S.A. +20°C.

**Ranges** (with 20% flight plan reserves): With max. payload, 500 naut. miles; with 20,000-lb. payload, 1,200 naut. miles; with 69 troops, 1,420 naut. miles; with 48 stretchers, 1,650 naut. miles; reinforcing range with extra tanks and 103,000 lb. take-off weight, 3,000 naut. miles; radius of action (returning empty) with 54 paratroops, 680 naut. miles; with two Land-Rovers and two ½-ton trailers, 770 naut. miles; with 11 one-ton A.22 containers, 280 naut. miles; with three loaded supply platforms, 260 naut. miles; with one three-ton G.S. Bedford truck and one Land-Rover, 940 naut. miles; with two L.A.A. guns, 580 naut. miles.

## Napier Changes

AT the end of the year Mr. H. Sammons, C.B.E., M.I.Mech.E., F.R.Ae.S., managing director of D. Napier and Son, Ltd., is to retire; he will be succeeded by Mr. H. E. C. de Chassiron, C.B.E. Mr. Sammons joined the Napier company in 1942 and became chief engineer the following year; he has been managing director since 1949.

Mr. de Chassiron has been assistant to the general manager of the English Electric Company's Rugby works since 1958. Born in 1908 he was educated at Haileybury and the Royal Military Academy at Woolwich. He was commissioned in the Corps of Royal Engineers in 1928 and in the course of a long and varied Army career held appointments at the School of Military Engineering (1940-1941), the General Staffs of the Combined Operations Development Centre, the United States War Department (Washington 1942-1943), and at Supreme Allied H.Q. South East Asia Command, where he also served as Deputy Director of Plans.

After attending the Imperial Defence College in 1949, he was made Brigadier General Staff, Intelligence, on the H.Q. staff of the Middle East Land Forces in Egypt. He later commanded the Engineer Group in Egypt. From 1953 to 1955, he was the U.K. National Military Representative at SHAPE in Paris after which he was Deputy Director of Manpower Planning at the War Office until 1957. He has already joined the Napier board as managing director designate.

## Authoritative Air History

THE marked increase of interest in aeronautical history which has taken place in recent years—an interest now being co-ordinated and consolidated in this country by the recently formed Historical Group of the Royal Aeronautical Society—has made it highly desirable that the official Science Museum handbooks on the subject, which where originally prepared by the late M. J. B. Davy in the 1920s and 1930s, should be replaced by more up-to-date works of reference. Charles Gibbs-Smith has now completed this task, at any rate so far as the story of the development of fixed-wing aircraft is concerned, with his monumental "The Aeroplane: An Historical Survey of its Origins and Development," published by H.M. Stationery Office on Sept. 2 at a price of 35s.

A comparison of Mr. Gibbs-Smith's work with those of Mr. Davy brings out the tremendous progress which has been made in the past 30 years in gaining a proper understanding of the true sequence of events and of the various factors which governed the origins and early development of the aeroplane. During this time, as a result of much industrious research, a great deal of new information has come to light covering not only events throughout the whole of the nineteenth century—during which almost all of the preliminary ground work was done—but also the first decade of the present century, the period during which the practical aeroplane itself was finally evolved.

Indeed, although this new study ambitiously sets out to cover in outline the complete story from ancient mythology to the dawn of the space era, it is with the critical period at the end of the nineteenth and beginning of the twentieth centuries, during which the practical aeroplane was "invented," that Gibbs-Smith is particularly concerned and on which he has wisely concentrated his main attention. The result is a *tour de force* which is certainly itself a notable landmark in our efforts to learn more about the history of all forms of technology. Such efforts are worth while not only so that we can have a better understanding of what we have already accomplished but also (and perhaps more importantly) so that we can apply the lessons of the past to the infinitely more complex problems of the present and the future.

Man's ability to tackle the ever-growing challenge to his further progress, which he meets as he continues to extend the frontiers of discovery over the whole field of science and technology, must depend very largely on his accumulated knowledge. This knowledge is, of course, mainly formalized and recorded, in both quantitative and qualitative terms, in our scientific and technical literature and in the growing understanding of their subjects by countless active specialists in every field. However, there is also a need for an understanding of the historical processes by which this knowledge is accumulated. Without it the new technical and scientific data may sometimes prove insufficient, particularly as a basis for the formulation of sound policies which are, of course, so essential to the efficient direction of further progress in an increasingly complicated environment.

Aviation has sometimes been, in the past, not too well served by its historians and much of the available literature on the subject is immature or even actually irresponsible. It tends to suffer particularly from insufficient research and cross-checking of historical facts and from an inadequate general knowledge of aviation on the part of the historians themselves who have thus too often failed to achieve that essential sense of perspective on which all historical interpretation must depend.

Mr. Gibbs-Smith has gone a long way to remedy this deficiency, particularly as it affects the advances in aerodynamics, structures and actual experiment in the air which took place between 1890 and 1908, the years during which the practical aeroplane emerged from its nineteenth century chrysalis. Most of the facts covering this period now seem to be properly identified and are set down—many of them for the first time—in this new official history. Mr. Gibbs-Smith has also provided us with a first, and most able, interpretation of these facts although some of them have come to light so recently—indeed while this book was actually in draft—that a complete perspective has, perhaps, been difficult to achieve.

No doubt Gibbs-Smith, and others, will in due course take a longer look at the new complete picture which has now emerged and will give us a final interpretation. A further book by the same author, called "The Invention of the Aeroplane," on which he is now working, may perhaps do just this.

Meanwhile, this latest Science Museum publication becomes the most authoritative general history of aviation yet written. It should win well-deserved recognition.—PETER W. BROOKS.

## *Air Transport*

# IATA TACKLES ITS PROBLEMS

### The Editor Reports From Copenhagen

WONDERFUL, wonderful Copenhagen! Every delegate and every guest attending the Sixteenth Annual General Meeting of the International Air Transport Association held last week in the Danish capital could be heard expressing the sentiment, if not actually humming the tune, of the song, in the course of the functions and ceremonies with which they were regaled so liberally by their hosts. The occasion was specially fortunate in that following an extremely moist summer, the IATA A.G.M. opened and was continued in splendidly warm sunshine. The Danish Government, and host airline, Scandinavian Airlines System, can be certain that their guests were most grateful for the hospitality shown.

The opening of the meeting and the report of the IATA director general were reported last week. This week we propose to deal in rather more detail with the proceedings of the meeting and, in particular, to discuss, under the appropriate headings, the problems which are occupying the minds of the members of IATA.

After the opening session, reported last week, the various committees and groups then go into closed meetings until the closing session. At these intermediate meetings the reports of the various sections are considered and, on approval, issued to the Press, who are able to question the chairman of the section on his report and on its implications. In this way IATA ensures that its conclusions and recommendations are rendered as widely available as possible. This is important in a World which is sometimes presented with a picture of the Association as a price-rigging octopus concerned to squeeze the air traveller. Study of the reports shows in fact how much the advance of civil aviation is due to the self-sacrificing work of committee members and their chairmen.

As the subsequent discussion will make clear problems of rates enforcement, the advent of the supersonic airliner and the need to improve ground handling facilities were the dominating concerns of this A.G.M.

#### Ground Handling Drive

Reports from the Executive Committee, from the director general about the delicate matter of enforcement and appeal, from the Financial Committee, from the Legal Committee, from the Technical Committee, from the Traffic Advisory Committee, from the Traffic Handling Group and from the Facilitation Group were available.

Emphasis was laid in the report by the chairman of the Executive Committee, M. Gilbert Périer, upon the efforts needed to solve the continuing problems of ground handling. To intensify the struggle against the loss of time in passenger handling, IATA has, as we reported last week, formed a Ground Handling Advisory Group. E. P. Whitfield, traffic director of British European Airways, is chairman; J. A. Clay, director of terminal service of Trans World Airlines is vice-chairman, and V. H. King, of the IATA Technical Liaison Office in London, is secretary.

The Facilitation Advisory Group (function of which is to cut through red tape) has already done much, though much remains to be done. Visitors to the conference were able to see for themselves what had been achieved in the fine new air terminal at Kastrup as a result of the full co-operation of the Scandinavian Governments. Baggage handling, customs and passport procedures work swiftly and smoothly. Behind the scenes paperwork has been so reduced that S.A.S. can accept passengers up to within 10 minutes of take-off. It is depressing to have to report a horrid contrast at London Airport. Eighty-six passengers got off the Comet 4 B which had wafted them across the North Sea in 85 minutes. British customs procedures are still so ponderous that this mass of people had to wait patiently while the strictly limited number of customs officers, whose patience and tact under load is so admirable, duly filled in forms and accepted payment on the various purchases made in Copenhagen's wonderful new duty-free airport shopping centre. It would be simple, surely, for the British customs to arrange for the necessary additional payments to be added to the bills in Copenhagen. All customs would have to do would be to accept the receipts as clearance certificates in London. They already accept them as evidence of value.

After this digression on customs obstructions, remaining in this tight little island, it is necessary to return to the IATA Passenger Handling Advisory Group and point out that its function specifically is not only to struggle with excessive government formalities, but also to tackle the effect of transport delays on overcrowded roads, poor layout of terminal buildings and other inadequate facilities.

Included in the terms of reference of the new group is the study of an integrated air cargo handling system. Vast though this subject is, we suspect that the physical problems of cargo handling may well be solved before those of customs inspection. Mr. Solve Haegerstrom, chairman of the Group, pointed out that present customs working hours in most countries provide for cargo clearance for only 30% of a full 7-day week, whereas passenger clearance is on a 24-hr. daily basis. Yet air cargo provides much the greater customs revenue.

#### More Enforcement Officers

Widespread attention was focused on the difficulties of maintaining agreed rates on heavily competitive routes, or at least over routes where too many empty seats are chasing too few passengers by the various subterfuges employed to effect rebates on South Atlantic fares last winter. One outcome of this situation was a discreetly worded reference in the Executive Committee's report to means of strengthening the enforcement of fares and rates agreed by Traffic Conferences and approved by Governments. Sir William Hildred, the director general, disclosed that a further 24 enforcement officers had been engaged at a total annual cost of $80,000.

Obviously, the responsibilities of the Financial Committee are extensive. Among the subjects which attracted popular interest was the question of insurance and the high premiums being charged for new and larger aircraft. However there has been no general support for a mutual insurance scheme to be organized by the carriers themselves. On the other hand there was a general agreement that brokerage payments should be decreased.

A matter of much wider import concerns the increase in landing fees and en route facilities. The Committee urged the aircraft operating companies to take both collective and individual steps to oppose such increases. To use a well-worn phrase this to us seems easier said than done. In fact in many cases airlines are dominated by the very Government agencies which control the airports and the charges. In such circumstances, it seems to us that collective action is likely to remain a pious hope.

#### Irritating the Passenger

Meantime passengers will go on being mystified, and in many cases irritated, by demands for airport charges. It is not so long ago that leaving Paris for the United States and in consequence having handed over all one's French francs one was faced with a demand for a four-figure payment in francs.

This is as irritating as buying duty-free goods quickly and easily in Copenhagen and then being held up in London while the customs collect the duty and issue a receipt. Passengers, we suppose, may relax in the knowledge that the coming of the Common Market and closer European co-operation will eventually cut out customs. Unfortunately, the application of British VTOL expertize to reduce the need for aerodromes seems disappointingly far away.

The lengthy report of the Technical Committee contained much interesting matter. Reference to kerosene and JP-4 initiated considerable discussion by the Press as to the relative safety factors of the competing fuels. No specific reference had been made to this aspect in the report but Mr. Knut Hagrup, the committee chairman, refused to accept the thesis that JP-4 was more dangerous than kerosene, as has been asserted so vigorously in England.

The matters of most immediate interest in the Technical Report are the decisions to hold two special technical conferences next year. The first is to be held at the end of April, 1961, in Montreal and will be to study the fundamental problems of the introduction of supersonic flight.

Working in conjunction with the manufacturers, the Advisory Group called into being by the Technical Committee is preparing the way for a Technical Conference devoted primarily to investigation into every conceivable aspect of the supersonic aircraft. For example, the Committee hopes in this way to

crystallize the airlines' ideas on some of the basic parameters of supersonic operation such as range, speed and aircraft size to a degree sufficient to permit rough estimates of their numerical value. Special consideration is to be given also to aircraft cooling, noise and air traffic control.

The mention of noise in this context is interesting, as it is known to be one in which members of the Committee are much interested. A much more extensive comment on the subject appeared in the director-general's report, as we noted last week.

It is certain that operators, by and large, would dearly love to postpone the introduction of the supersonic airliner for many years. Equally it is certain that now the supersonic aircraft is technically possible the airlines will have to learn to love it and live with it. There is every promise, therefore, that all the manufacturers interested in the problem will be represented at the conference and as among their number there will be the most vigorous and successful technical salesmen in the World the discussion, official and unofficial, is certain to be exciting and hard-hitting.

It was made clear at Copenhagen that not only is a special Technical Conference to be devoted to the supersonic aircraft but a similar conference is to be held later on cargo aircraft. It seems somewhat late in the day for IATA to issue recommendations when so much work has already been done by manufacturers. It is well known that the customer is always right, but the associated problem of what it is that the customer wants is solved, so it always seems, by inspired guessing on the part of the manufacturer.

It is to be noted that the Technical Committee have made no comments on the operation of helicopters or VTOL aircraft. The first have been with us for a long time and the second are certain to be in, at least limited, operation before the supersonic aircraft. It must be assumed that the time of the Technical Committee is necessarily restricted and in consequence these are matters that will have to wait their turn.

Among the problems covered that of air traffic control was prominent. The views of IATA are succinctly expressed in the statement that the prospects for improvement in air traffic control services are promising, but no revolutionary advances can be expected. Reference is made to the progressive elimination of Visual Flight Rules which IATA believes to be essential for efficient air traffic control in the jet age. However, the pragmatic view taken of the situation is emphasized by the observation that shortage of trained air traffic personnel is still a major bottleneck. The need to attract and keep properly trained personnel as controllers is emphasized.

## State-supported Pilot Training

LAST week the first 21 cadets started their training as civil airline pilots at the new College of Air Training at Hamble. In five weeks' time the second intake of 21 is expected to join the College, which now occupies the airfield and buildings previously forming the Air Service Training Schools.

Formed in May of this year, the College is the first State-supported establishment of its kind in this country, being sponsored jointly by the Ministry of Aviation, B.O.A.C. and B.E.A. It is also supported by the independent airlines and the Minister of Education, who has notified local authorities that he will give favourable consideration to the award of grants to cadets.

The College is controlled by a board of governors—under the chairmanship of Capt. J. W. G. James, Flight Operations and Communications Director of B.E.A.—on which the two Corporations, the two interested Ministries and the Independents are represented. The Principal is Air Vice-Marshal E. C. Bates, C.B., C.B.E., A.F.C., who was the first Commandant of the R.A.A.F. Central Flying School and has also commanded flying training schools in Canada and the United Kingdom. He retired from the R.A.F. in January, 1959.

In addition to Air Vice-Marshal Bates, there is at present a staff of seven flying instructors under the C.F.I., Sqn. Ldr. G. C. Webb, A.F.C.; five ground school lecturers, including two instrument flight trainer instructors, headed by Sqn. Ldr. C. N. Hoy; a director of studies; and a tutor for general education. It is planned that this establishment will be increased later as the flow of cadets is stepped up.

The complete College site occupies more than 216 acres, of which 173 acres comprise the grass airfield with its hangars and control tower. When the present building, alteration and redecoration programme is completed, it will eventually be capable of accommodating and training 220 cadets simultaneously.

For this number of student pilots the College is to build-up a training aircraft fleet of 21 de Havilland Chipmunks and nine Piper Apaches. These will be supported by five D4 Link trainers and two electronic two/four turbojet procedure trainers, manufactured by General Precision Systems to the College's own specification. At the present time 10 of the proposed Chipmunk fleet are at Hamble and the first six Apaches will be there by September of next year—building up to nine by August, 1962.

Candidates straight from school must be between 18 and 20 years of age, while those holding a university degree must be under 24 years at the time of admission to the College. For initial selection, applicants must be educated to G.C.E. standard, with two "A" passes and a minimum of five "O" level passes, and pass a preliminary interview and written test. This is followed by a two-day residential selection board and five hours flying grading—all at Hamble.

Both the first and second entries, totalling 42 cadets, will go to B.O.A.C. in 1962. But from 1963 to 1967 there will be a total annual requirement from B.O.A.C. and B.E.A. for approximately 50 cadets each. The final numbers to the individual Corporation will, however, depend upon actual year-to-year requirements.

Following the start of the second entry at the College next month no more new cadets will be admitted until September, 1961. After this date groups of 12-13 cadets will join every six weeks, bringing the average number of Corporation cadets under training at any one time up to 200 by September, 1963.

The course at Hamble will last two years, during which time cadets will receive 150 hours basic flying on Chipmunks and 75 hours advanced instruction on Apaches. By the end of the course each cadet will have obtained his Commercial Pilots' Licence with an instrument rating endorsement, and his Radio Telephony Licence.

On successful completion of the course, cadets will join either Corporation as Second Officers. In B.O.A.C. the intention is for them to take the civil air navigation examination within three months and then go on to the big turbojets as junior pilot/navigators with a limited licence until they have logged the required hours for their Air Transport Pilot's Licence. After this they will start training as fully competent co-pilots on a particular type, so that they should be route flying in this capacity six years after entering the College.

B.E.A., on the other hand, intends to get them into the right-hand seat of a Viscount, or similar type, with full co-pilot qualifications within six months. In either case, cadets starting the College of Air Training course at 18, can become £1,200-a-year Second Officers before they are 21 years of age.—P.R.R.

## Protectionism in Central America

BECAUSE its national (and nationalized) airline, Aviateca, is in serious financial difficulties and needs all the traffic it can get, the Guatemalan authorities are cancelling the traffic rights of two of the carriers flying into the country.

These are TACA International Airlines—which has been operating through Guatemala for more than 20 years—and ASA International Airlines, an all-freight carrier. No action has yet been taken to restrict the other carriers operating through or to Guatemala—Pan American, K.L.M. and LACSA, the Costa Rican flag line. TACA is the El Salvador flag line based in New Orleans and is primarily U.S.-owned.

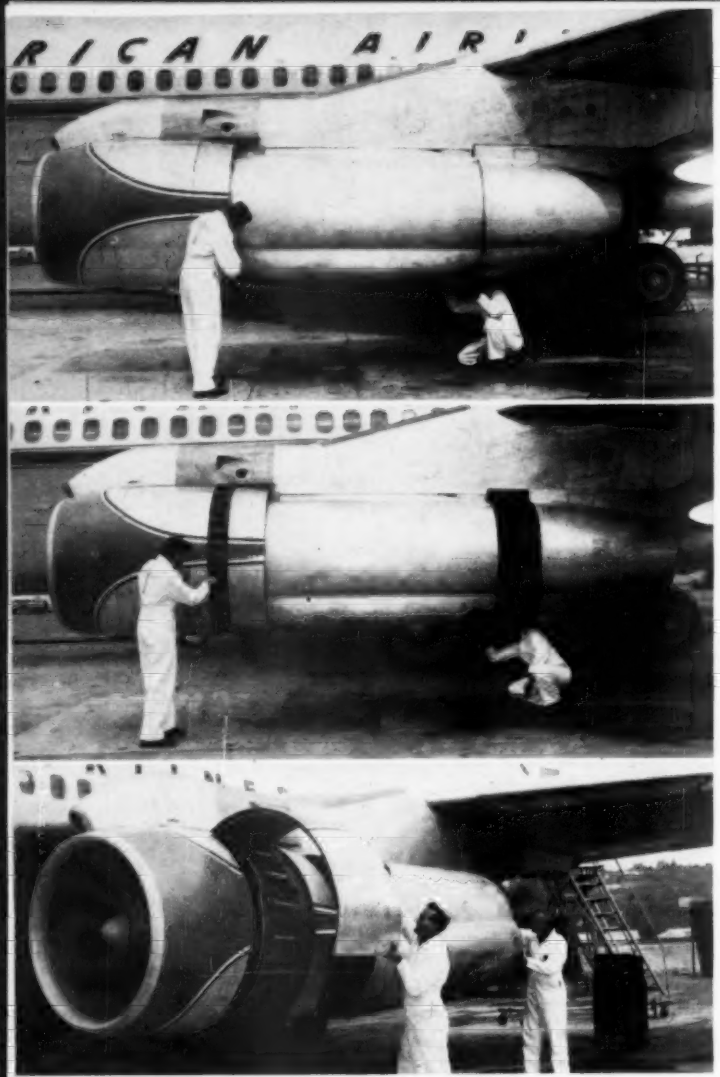
Much of the trouble for Aviateca and other Central American carriers seems to be based on the fact that they operate very cut-rate services. Aviateca itself charges $99 for the round trip New Orleans—Guatemala—New Orleans whereas Pan American and TACA charge $136.

To observers in this area (writes a correspondent), the financial plight of Aviateca is typical of the situation facing several nationalized airlines, representing small countries in the Central American and Caribbean area, which have attempted to branch out from local operations into the international field.

These observers state that LACSA, for instance, which operates to Miami and elsewhere in the Caribbean, is losing money although it profits from its domestic operations: SAHSA (Honduras) also operates to Miami and Peru at cut-rate prices and is believed to lose money; and COPA (Panama), attempting to operate in the international field, is also allegedly losing money.

Whether Guatemala can stand the financial strain of operating its own airline in international competition, at a time when the government itself is in serious financial stress, is an open question. Meanwhile, TACA International appears to be the first passenger airline likely to feel the effect of efforts to cut back serious competition. It is still, in fact, operating through Guatemala, but on a temporary permit.

# Air Transport . . . .



TURBOFAN TRICKS.—Described below and illustrated here on the prototype Boeing 707-120B for American Airlines (80 hours testing to date) are, top to bottom, the complete JT3D-1 installation; the aft-sliding doors for front and rear reversers; and the additional intakes for use at take-off.

## Turbofan Installation

PHOTOGRAPHS released by Boeing last week (see above) show for the first time the modifications which have been made to allow the installation of the 17,000-lb.s.t. Pratt & Whitney JT3D-1 turbofan. Compared with the 13,500-lb.s.t. JT3C-6 in the Boeing 707-120, the D-1 engine has a larger-diameter two-stage fan replacing the first three stages of the low-pressure compressor, a modified third-turbine stage and a new fourth-turbine stage.

The diameter of the intake—much larger than for the C-6—has been selected for optimum cruise conditions, and additional air intakes for use at take-off are provided round the cowling. Under conditions of negative pressure within the intake, spring-loaded doors open to take in additional air, admitted to the intake through two rows of circular holes.

Fan air is ejected circumferentially immediately aft of the compressor section of the engine. For thrust reversing, two sections of the cowling slide aft. The forward cowling section is linked mechanically to the vanes which close off the fan-air passage, while actuation of the internal clamshell doors in the main exhaust flow serves to move the rear cowling portion aft to expose the reverser cascade vanes.

No silencers are fitted on the turbofan engine; the cold (fan) air mixing with the hot exhaust is said to reduce noise.

## J.A.L. Expansion

EARLIER proposals for Japan Air Lines' expansion have now hardened into concrete plans. Although these proposals continue to depend on the successful negotiation of traffic agreements, the Japanese Government has authorized the expansion, is guaranteeing the necessary loans and is prepared to subsidize the new services for the time being.

J.A.L. will have three DC-8s by the end of this month, with two more to be delivered during the coming five months, and has three Convair 880-22Ms for delivery next year. Two DC-8s are already operating on the trans-Pacific services to Seattle, San Francisco and Los Angeles, with four flights per week.

The first extension will consist of an Arctic service with DC-8s to Europe, via Anchorage, Alaska, the start of which is planned for June, 1961, with two return services per week. Later in 1961 J.A.L. expects to start operating over the so-called eastern route, to and from London, using 880s, with traffic stops at Bangkok, Calcutta, Karachi, Beirut, Rome and Paris. Negotiations with the U.S.A. are to be started soon for trans-continental operating rights and services will then be extended, in pool with Air France, over the North Atlantic to complete a round-the-World system by 1963/64.

Of J.A.L.'s four DC-7Cs, previously used on the Pacific services, two are being converted for all-freight work and two are being put on the longer-haul domestic services with high-density layouts for very-low-fare operations. One of them, incidentally, specially equipped, is being chartered for the Japanese Crown Prince's forthcoming visit to the U.S.A.

## Licensing Transition

THE Air Transport Licensing Board (see our issue for Aug. 5, 1960) will be formally constituted as from Oct. 1, and a nucleus of the secretariat to serve this important new body is already functioning. Temporarily, the address is 3 Dean's Yard, Westminster, S.W.1. (Tel.: Sullivan 7166). The secretary to the A.T.L.B. is Mr. J. E. Barnes.

Further details have been given by the M.o.A. of the arrangements for issuing licences during the transitional period while the Air Transport Advisory Council is still functioning. So far as inclusive tour and circular tour services for the winter of 1960-61 are concerned, the customary procedure will be followed.

Other services recommended by the Council which the Minister decides to accept will be the subject of transitional air service licences, or "X" and "Y" licences in the case of inclusive tours, circular tours and separate fare operations (our issue for May 20). It is planned to list all approved "X" and "Y" licence applications for services after Mar. 31, 1961, in a single statutory instrument early next year.

Existing and other approved services which will operate on transitional air service licences during 1961 will be listed in a comprehensive statutory instrument now being drafted. It is hoped to have this draft available for consultations with operators in October.

The regulations giving effect to the Civil Aviation (Licensing) Act, 1960, which were circulated as a draft for comments during July (see our issue for Jly. 29) are expected to be made firm towards the end of November. A full timetable for the introduction of the new arrangements will then be drawn up, and it is expected that Section 1(2)b of the Act will be brought into force around the end of March, 1961. Section 1(2)b requires all air transport operations to have an appropriate air service licence.

## Fear and Noise Nuisance Values

IN his paper on noise annoyance to the British Association early this month, Professor E. J. Richards called for more studies to be made of fear as a factor in individual reactions to aircraft noise. Most people who complain about aircraft noise have been said to be suffering from some nervous state. While the truth of this is hard to assess, it has been shown (in a 1957 study) that 80% of those who expressed great annoyance at aircraft noise showed indications that fear of crashes was involved in their reactions. This is shown here:—

| | Some annoyance | Great annoyance |
|---|---|---|
| Direct expression of fear .. | .. 25% | 60% |
| Indirect expression of fear .. | .. 38% | 20% |
| No indirect expression of fear | .. 37% | 20% |

This would imply, said Prof. Richards, that much better methods of publicity regarding the insignificantly small element of danger in take-offs and landings compared with other everyday dangers would pay handsomely and allay the fears and annoyances of many dwellers near airports. Fear arising from unfamiliarity with the source has also been the cause of many complaints about supersonic bangs, and this

(*Continued on page 443*)

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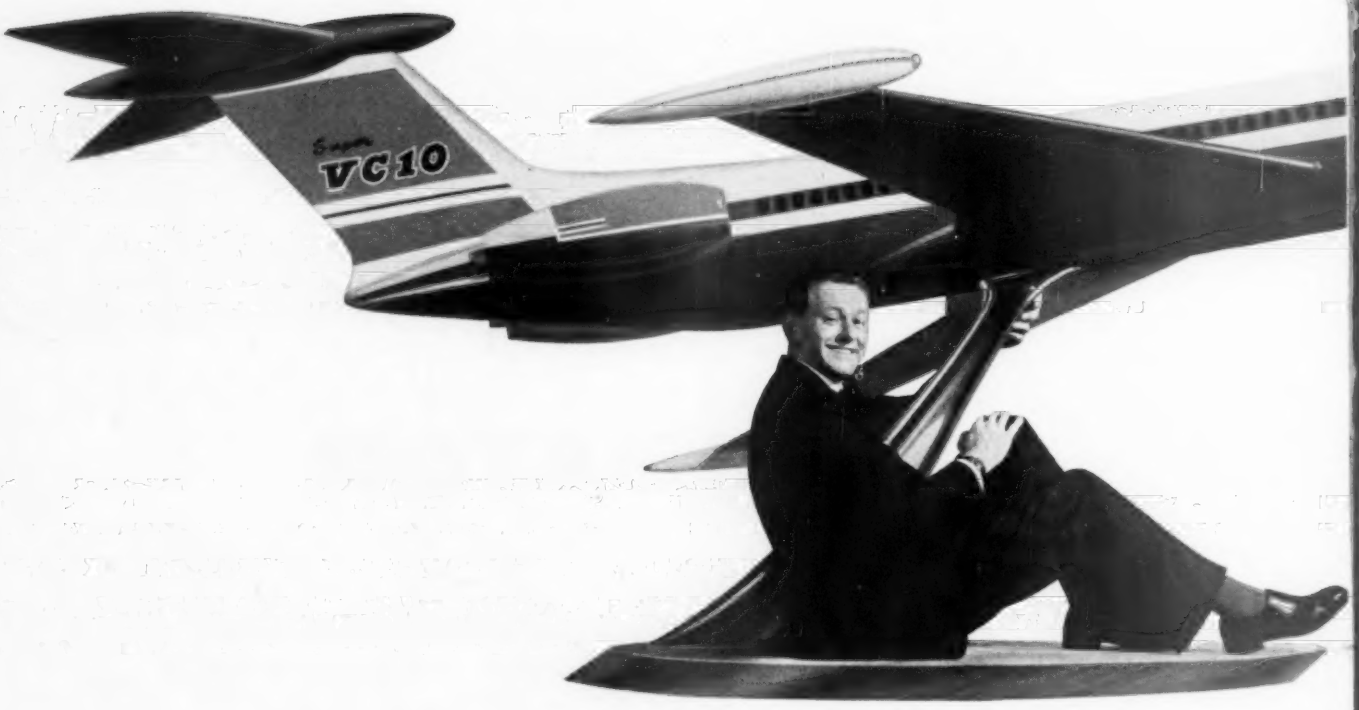
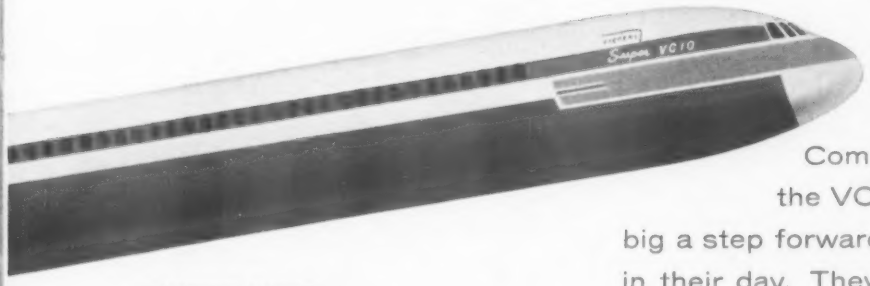


# the Clean-wing Jets

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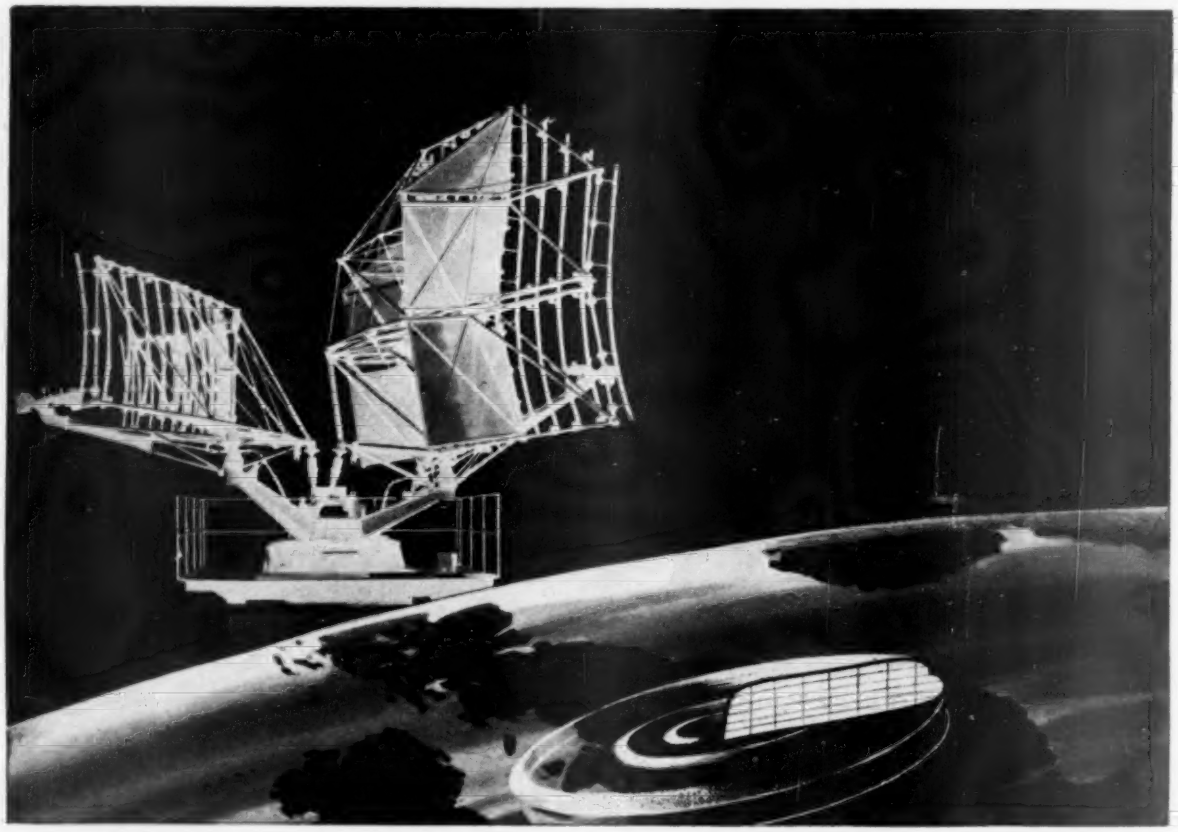

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## *Air Transport . . .*

Halifax International Airport and its $4,500,000 terminal building were opened on Sept. 10, 1960, as noted below. Airlines which formerly used the naval air station at Dartmouth, N.S., will use the new airport 21 miles from Halifax. This illustration shows the "crooked finger" layout with four gates.

(*Continued from page 442*)

is of importance in relation to the development of supersonic airliners.

Among other points made by Prof. Richards in his concise survey were that the large anticipated increase in jet operation in the next few years is likely to need to be matched by a reduction of 5-7 PNdb in the acceptable limit around airfields, and that the night limit needs to be about 10 PNdb below the daytime limit. Interference with evening listening to radio or TV or with conversation is a bigger source of annoyance than interruption of sleep or rest. Investigation of jet noise on landings suggests that the acceptable limit might need to be as much as 6 PNdb lower than that set for take-offs, because of high-frequency compressor noise.

### New Halifax Airport

THE new Halifax (N.S.) International Airport and its $4,500,000 terminal building were opened on Sept. 10 by Canada's Minister of Transport, Mr. George Hees.

Airlines serving Halifax formerly used H.M.C.S. "Shearwater," the naval air station at Dartmouth. Although this base is very close to the city, it lacks suitable accommodation and is plagued by bad weather. Construction of the new airport, which is 21 miles from the city, started in 1956, following detailed meteorological observations on several potential sites.

The 165,000-sq.-ft. terminal was designed to separate incoming from outgoing passengers. A five-storey control tower surmounts the building.

Two runways, of 8,800 ft. and 7,700 ft., have been built. Electronic aids include an LF radio range, an instrument landing system (the Dartmouth ILS is remotely controlled from Halifax) and airways surveillance radar with a range of 150 miles, one of 15 such installations at Department of Transport airports across Canada.

At Gander, Newfoundland, where the international airport is the only industry, residents fear the new Halifax airport will attract traffic which would otherwise have landed at Gander.

The Halifax terminal is one of many recently built or under construction by the Department of Transport in a $62,000,000 programme. Work is still going on at terminals in Toronto, Montreal (Dorval), Edmonton and Winnipeg.—N.A.M.

# Examining the Air-freight Potential

WITH the sales prospects for the Britannic very much in mind, Short Brothers and Harland have made a second attack on the formidable problems involved in estimating the potential World air-freight market.

In the first report, "Potential Air Freight Survey" (No. PD.Gen/14), an attempt was made to forecast the achievable expansion of air cargo. In this second report, "Survey of World Trade and Air Freighting" (No. DD.44), a study has been made of U.K. trade in relation to the types of goods which are "airworthy"; of World traffic (using figures for the 10 major exporting countries) in order to establish the pattern of trade; and of the distribution of goods in terms of value per unit weight so that an estimate could be made of the freight likely to be carried over various distances.

The broad findings are that air freight increases at a rather higher rate than that of trade; that a 50% drop in freight rates would increase the traffic fourfold; and that the bulk of the air-freighting potential lies in ranges up to about 1,250 miles.

Studies which might profitably be completed in extension of those already done include those on rate structures; on total air-freight costing; on shippers' reasons for the use of air freight for some commodities and not for others; and on the overall speed of short-distance international air freighting. The point about total costing which is important is that certain costs, such as crating, may be included in a factory's overheads and the full benefits of air freighting may not always be appreciated.

A great many significant facts and figures have been unearthed and put into perspective by the tabulations and comments in the report.

For instance, the table of U.K. trade figures for 1958 shows that the value of airborne goods was 3.7% of the total exports, but was only 6.6% of the exports in the special commodity groups—those of air-cargo interest. The exported special commodities had a total value equivalent to about 42% of the total.

Using the United Nations' Trade Statistics for 1957—the latest available—it is shown that the biggest values of manufactured exports of the 10 major exporting countries travel over distances up to 500 miles. The percentages drop down to small single figures above 1,000 miles, but rise temporarily to double figures over stages of 3,500-4,000 miles—a fact explained by the existence of the North Atlantic.

A table giving the distribution by value per unit weight for the Organization for European Economic Co-operation countries in manufactured goods (1957) shows that those of the highest unit values (1,600-1,700 pence/lb.) totalled only 500 (long) tons, while those of the lowest value (0-10 pence/lb.) totalled 18,007,000 tons. The highest weight of goods in the 100-1,700 pence/lb. range was 315,000 tons in the 100-110-pence/lb. range.

On a basis of known air-freight rates the report assumes a World average overall air-freight rate of 30 pence/ton-mile and the earlier report had shown that a figure of 5% of the value of the goods was about the limit which could be borne in transport charges for most commodities. Using these figures, it can be seen that the commodity value must be at least 270 pence/lb. for each 1,000-mile transport stage.

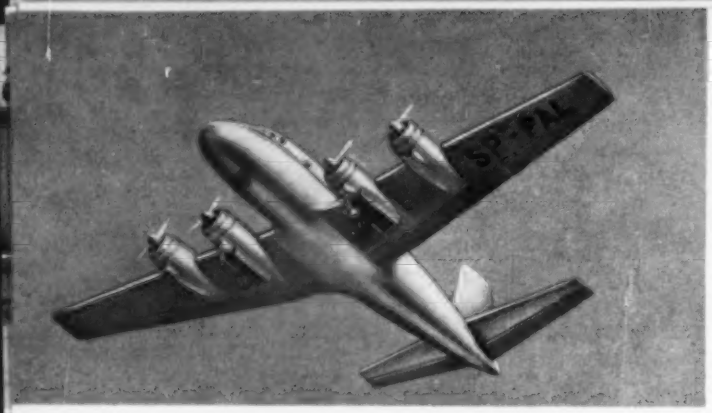
The report shows that the potential air freight in manufactured goods for 1957 exported from the 10 major countries totals 164,400,000 ton-miles, with (assuming a minimum practical distance of 250 miles) 124 million of this total being yielded over stages up to 750 miles. The estimated total for the 10 countries is equivalent to about 560 million ton-miles for overall World traffic—and is in fair agreement with the total of 670 million returned by IATA carriers for the same year.

Progressive reductions in the air-freight rates could have the scale effects shown in this table:—

| RATE (% of that prevailing) | TRAFFIC INDEX | REVENUE INDEX |
|---|---|---|
| 100 | 100 | 100 |
| 90 | 128 | 118 |
| 80 | 155 | 125 |
| 70 | 200 | 140 |
| 60 | 273 | 163 |
| 50 | 400 | 200 |

All of which, although mildly academic, will be very valuable as encouragement for those who remain uncertain of the potentials of air freight.

# Air Transport . . . .



## Polish Short-hauler

NOW undergoing flight trials in Poland is the prototype of a small, piston-engined feeder liner designed primarily for domestic services over short ranges. Developed from an earlier twin-engined design, the CSS-12, the new aircraft is known as the MD-12, taking its designation from the names of the joint designers, Franciszka Misztala and Leszka Dulebe. The design and construction were handled at the Instytucie Lotnictwa (Aeronautical Institute). Its general appearance is shown in the accompanying artist's impression.

Designed primarily to serve internal routes, the MD-12 is to replace DC-3s and Li-2s, which still form the backbone of LOT's flying equipment. It is also hoped that foreign operators will be interested in purchasing the MD-12 when it is available for export. The main attractions are a robust and simple all-metal structure with economy and good handling qualities. It is calculated that on stages up to 400 km. (284.5 miles) cost per passenger-mile will be 13% less than that achieved on DC-3 and 11% less than with Li-2. On routes up to 600 km. (375 miles) cost per passenger-mile will be 14.5% and 13.5% less, respectively.

The freighter version features two loading doors, on opposite sides of the fuselage, measuring 1.50 m. (4 ft. 11 in.) by 1.40 m. (4 ft. 7 in.). Folding bench-type seats are fitted along both sides of the fuselage, and the strengthened floor allows for a concentrated load of 900 kg./sq. m. (184.3 lb./sq. ft.). In the passenger version, an orthodox seating layout for 20 is provided. Both versions have dual control in the two-seat cockpit; the co-pilot operates the radio.

The twin main wheels retract forwards into inner engine nacelles and protrude, when retracted, to protect the engines from damage during an emergency wheels-up landing. The twin nose-wheel retracts backwards. Two flexible fuel tanks in the wing centre section have a maximum capacity of 960 litres (211 Imp. gallons).

Considerable thought was given to the de-icing system, which uses exhaust heat. Hot air is ducted from heat exchangers fitted to each engine, to all leading edges of the lifting surfaces and the propellers are protected by anti-freeze fluid. High efficiency hydraulically operated flaps are fitted.

Radio equipment, to suit customers' requirements, can consist of short/medium wave communication radio, UHF instrument landing system, radio compass, and radio altimeter.

**Design Data**

**Dimensions.**—Span, 69 ft. 10¼ in.; length, 51 ft. 8¼ in.; height, 19 ft.; wing area, 592 sq. ft.; aspect ratio 8.25.

**Weights.**—Empty, 10,913 lb.; fuel and oil, 1,764 lb.; payload (20 passengers and baggage), 3,858 lb.; max payload, 5,622 lb.; gross weight, 16,534 lb.; take-off wing loading, 27.6 lb./sq. ft.; take-off power loading, 12 lb./h.p.

**Performance.**—Cruising speed at 2,500 m. (8,200 ft.), 154 knots; range with 20 passengers, 380 naut. miles; take-off to 50 ft., 2,132 ft.; take-off to 50 ft. on three engines, 2,625 ft.; initial rate of climb, 984 ft./min.; rate of climb on three engines at 4,920 ft., 394 ft./min.

**Powerplant.**—Four Narkiewicz WN-3 seven-cylinder air-cooled radials giving 340 h.p. at take-off at 2,350 r.p.m., driving constant-speed, feathering propellers.

## O.A.T. of Manchester

SIX months ago, Overseas Air Transport Ltd. established a maintenance organization at Manchester, and started charter operations from Ringway with a de Havilland Heron. We now hear from the company that a considerable expansion is taking place in the engineering organization, and the purchase of another Heron is being negotiated.

Overseas Air Transport—not to be confused with Overseas Aviation (C.I.) based at Southend and Gatwick—was formed early in 1957 and purchased the Heron G-ANCI. This aircraft was leased to Dan-Air for six months, then to Cambrian Airways and finally to North South Airlines of Leeds/Bradford Airport. O.A.T.'s own charter operations make use of a second Heron, G-AOZN, with which in the past six months a considerable amount of executive flying has been undertaken for companies in the Midlands, as well as newspaper freighting and general passenger flying.

The company's directors are Lord Calthorpe (manager); A. G. Calthorpe, P. F. Gurdon and Capt. I. D. Wallace (chief pilot). Secretary is Mr. B. G. Lihou, technical manager Mr. J. B. Treacy and the head office is in St. Helier, Jersey.

## Cork Airport Progress

DIRECT services between the principal British airports and the southern part of the Irish Republic are likely to be started in the summer of 1961 when the new airport at Cork is due to be completed.

A site of 500 acres at Ballygarvan, about five miles south of Cork City, is being used and two concrete runways are being constructed. The main runway (17/35) will be 6,000 ft. in length and the subsidiary (07/25) will be 4,300 ft. long; both will be 150 ft. in width. The site is 520 ft. above sea level.

Up-to-date lighting, approach and navigational aids are to be provided, including an instrument landing system for the main runway. Medium-weight jet aircraft and long-haul jet aircraft, subject to restriction of gross weight and operational range, will be able to use the runway system. The terminal premises will comprise separate passenger-handling and cargo buildings.

Aer Lingus proposes to institute scheduled services from Cork to Dublin, London, Bristol, Cardiff, Jersey, Paris and Lourdes. Applications have been made to the A.T.A.C. by various British independent operators to work scheduled services between Cork and London, Manchester, Liverpool, Newcastle-on-Tyne, Leeds/Bradford, Bristol, Cardiff, Swansea, Haverfordwest and Bournemouth.

Approval has so far been given by the Ministry of Aviation, on A.T.A.C. recommendation, for operations by Cambrian Airways, Ltd. (see our issue of Aug. 19, p. 227), from London/Bristol/Cardiff/Swansea; Derby Aviation, Ltd., from Manchester/Derby/Birmingham; B.K.S. Air Transport, Ltd., from Newcastle/Leeds/Bradford; and East Anglian Flying Services, Ltd., which has applied for a vehicle-ferry service from Bristol. The recommendations are now under consideration by the Irish aviation authorities.

There is at present a licensed private aerodrome, with a 2,460-ft. east-west grass runway, at Farmer's Cross, about four miles south of the city. There are no lighting or radio facilities and prior permission from the licensee is required before aircraft can use it. There is also a private aerodrome about 60 miles away at Dunmore East, near Waterford. Here there are three grass runways: E/W, 1,230 ft.; N.E./S.W., 2,250 ft.; and N.W./S.E., 1,290 ft. Again there are no lighting or radio facilities and prior permission is needed before its use.

## Up and Up

DURING July, B.E.A. carried more than half a million passengers and achieved a revenue of more than £5 million—both figures being records. Indications to date, in fact, are that all previous traffic and operating records should be easily broken in the current (1960/61) financial year. As the table below shows, July 1960 traffic was 23% above the 1959 level; the rate of growth in August was also around 20%.

The financial results for the present year can hardly be expected to match those for 1959/60 when B.E.A. made a record profit of more than £2 million, because of the extensive introduction of lower fares. A substantial profit is, however, being forecast.

**B.E.A. TRAFFIC RESULTS—JULY 1960**

| | July 1960 | July 1959 | Variation |
|---|---|---|---|
| Capacity ton miles offered .. | 26,780,000 | 21,614,000 | +23.9% |
| Load ton miles sold .. .. | 18,382,000 | 14,887,000 | +23.5% |
| Revenue load factor .. .. | 68.6% | 68.9% | − 0.4% |
| Passengers carried .. .. | 509,435 | 412,897 | +23.4% |
| Passenger miles flown .. .. | 175,479,000 | 143,115,000 | +22.6% |
| Passenger load factor .. .. | 72.2% | 73.2% | − 1.4% |
| Freight ton miles .. .. .. | 1,358,000 | 1,056,300 | +28.6% |
| Mail ton miles .. .. .. | 354,200 | 303,900 | +16.7% |
| Aircraft miles flown .. .. | 4,672,700 | 4,314,400 | + 8.3% |
| Revenue hours flown .. .. | 22,941 | 22,852 | + 0.4% |

# The Fighting Services

## Australian C.A.S. Designate

AIR VICE-MARSHAL V. E. HANCOCK, C.B., C.B.E., D.F.C., R.A.A.F., is to succeed Air Marshal Sir Frederick Scherger, K.B.E., C.B., D.S.O., A.F.C., R.A.A.F., as Chief of the Australian Air Staff with effect from May 29, 1961. At present Air Officer Commanding, Operational Command, Air Vice-Marshal Hancock will take up his new appointment with the rank of Air Marshal.

Air Vice-Marshal V. E. Hancock.

Director of Air Staff Plans and Policy at R.A.A.F. Headquarters in 1946, Air Vice-Marshal Hancock became Commandant of the R.A.A.F. College, Point Cook, in September, 1947. He completed the Imperial Defence College Course, London, in 1950, and served as Deputy Chief of the Australian Air Staff from 1951-52. From 1953 to 1954 he was Air Member for Personnel, and in 1955 took over as Head of the Australian Joint Services Staff, London.

On his return to Australia in early 1957, he was appointed Air Officer Commanding No. 224 Group R.A.F. in Malaya. In August, 1959, he assumed his present appointment of A.O.C., Home (now Operational) Command.

## Lord Trophy Presentation

THE Air Officer Commanding Air Forces, Arabian Peninsula, Air Vice-Marshal D. J. P. Lee, recently presented the Lord Trophy to the C.O. of No. 84 Squadron, Sqn. Ldr. H. W. Guile, at R.A.F. Khormaksar, Aden. An efficiency award competed for annually by Transport Command squadrons, the trophy was won by Flt. Lt. P. V. Mayall and his Beverley crew when the competition was held at R.A.F. Colerne earlier this year.

Runners-up in the competition, which included low-level flying, navigation and paratroop dropping, were No. 30 Squadron from R.A.F. Eastleigh, Kenya—also of the Arabian Peninsula Command.

## A Year's Work

DURING the past 12 months the two Coastal Command search and rescue helicopter squadrons—Nos. 22 and 228—have flown 410 rescue missions, 181 abortive searches, evacuated 62 casualties, and undertaken 57 live rescues around the United Kingdom coast line. They have also undertaken their usual number of air-sea rescue and other exercises to bring their combined flying time since Sept. 1, of last year, up to a total of 7,120 hr.

No. 22 Squadron (Sqn. Ldr. A. P. Dunn) with headquarters at R.A.F. St. Mawgan, is controlled by No. 19 Group, Plymouth, and its detachments are now deployed at Chivenor, Valley and Felixstowe. Until recently there was also a No. 22 Squadron detachment at Thorney Island. No. 228 Squadron (Sqn. Ldr. J. Badeni) has its headquarters at Leconfield with detachments at Acklington, Horsham St. Faith and Leuchars, and is controlled by No. 18 Group at Pitreavie.

## R.A.F. Appointments

THE following are among recent Royal Air Force appointments:—

**Air Ministry:** Wg. Cdr. E. B. Panter, D.S.O., D.F.C., and Wg. Cdr. D. S. V. Rake, O.B.E., A.F.C., to the Department of the Chief of the Air Staff.

**Bomber Command:** Wg. Off. C. E. Warren, O.B.E., to Headquarters as Command W.R.A.F. Administrative Officer.

**Transport Command:** Wg. Cdr. A. Mackleden to Headquarters as Wg. Cdr., Engineering.

**Flying Training Command:** Wg. Cdr. E. J. Brice, O.B.E., to the R.A.F. College, Cranwell, as Cadet Administrative Officer; Wg. Cdr. E. A. Fairhurst, D.F.C., T.D., to the Aircrew Selection Centre, R.A.F. Hornchurch, as Deputy President.

**Technical Training Command:** Gp. Capt. K. R. Merritt, B.A., to Headquarters as Gp. Capt., Plans; Gp. Capt. W. G. Oldbury, O.B.E., D.F.C., to Headquarters, No. 24 Group, as Senior Officer in charge of Administration.

**Maintenance Command:** Wg. Cdr. H. J. Lucie-Smith to Headquarters, No. 4 Group, for operations duties.

**Signals Command:** Wg. Cdr. E. M. Sparrow, D.F.C., to No. 51 Squadron, R.A.F. Watton, to command.

**R.A.F. Germany:** Wg. Cdr. W. T. Wakenham, M.B.E., to Headquarters as Wg. Cdr., Engineering; Wg. Cdr. R. S. J. Edwards, D.F.C., to Headquarters; Sqn. Ldr. C. R. Gordon, M.V.O., to Headquarters for operations duties with acting rank of Wg. Cdr.

**Other Appointments:** Gp. Capt. H. A. S. Disney, O.B.E., M.A., to the Joint Services Staff College as Senior R.A.F. Instructor; Gp. Capt. E. A. Johnson, O.B.E., to the British Defence Staff, Washington; Gp. Capt. E. G. Watkins, C.B.E., A.F.C., to the NATO Standing Group, Washington.

## More Service News

**Toronto Air Show.**—Two Bomber Command Valiants of No. 90 Squadron on a "Western Ranger" exercise took part in the Canadian National Air Show at Toronto on Sept. 9-10. Captains of the two aircraft were the Squadron Commander, Wg. Cdr. J. Miller, D.F.C., A.F.C., and Flt. Lt. P. Goodhall.

**Record Scramble.**—The fastest Bomber Command V-bomber scramble of the S.B.A.C. Show was made by the four Vulcans of No. 617 Squadron (Wg. Cdr. L. G. A. Bastard, A.F.C.). The first aircraft was off the ground in exactly 1 min., and all four were airborne in 1 min. 24 sec.—13 sec. faster than the second best time set up by the Valiants of No. 148 Squadron.

**New Colour Squadron.**—The Queen's Colour for the R.A.F. in the United Kingdom is to be handed over to the R.A.F. Regiment during a ceremonial parade at Uxbridge on Nov. 1. The Regiment is at present forming a new Queen's Colour Squadron at Uxbridge under the command of Sqn. Ldr. P. Hutchins.

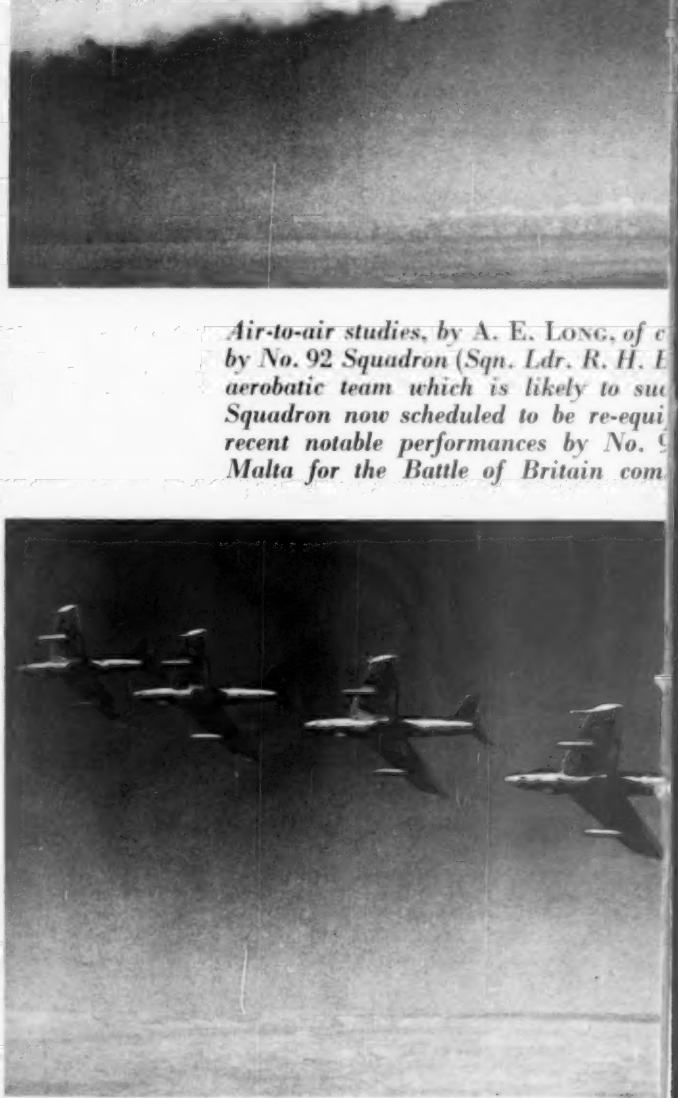
**R.C.A.F. Cosmopolitans.**—The first of 10 CC-109 Cosmopolitans for the R.C.A.F. Air Transport Command made its inaugural cargo flight last month from Ottawa to Goose Bay. The transports are to be operated by No. 412 Squadron at R.C.A.F. Uplands.

HIGH LEVEL.—Three English Electric Canberra PR.9s of No. 58 Squadron. Forming part of the United Kingdom Reconnaissance Force, the Squadron is commanded by Wg. Cdr. N. C. Thorne, A.F.C., and based at R.A.F. Wyton.

# Following A Great Tradition

Photographs copyright "The Aeroplane and Astronautics"

*Air-to-air studies, by* A. E. LONG, *of c*
*by No. 92 Squadron (Sqn. Ldr. R. H. L*
*aerobatic team which is likely to suc*
*Squadron now scheduled to be re-equi*
*recent notable performances by No. 9*
*Malta for the Battle of Britain com*



*lose formation flying performed*
*. Dixon)—the R.A.F.'s reserve*
*ceed the renowned Treble One*
*pped with Lightnings. Among*
*2 Squadron was a display at*
*memorations there last month.*

# "HOME-BUILTS"

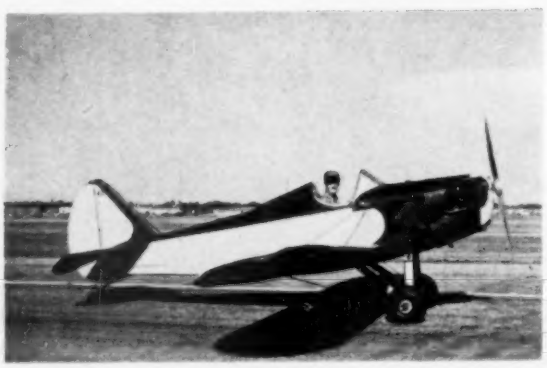
AMERICA'S Experimental Aircraft Association held its eighth annual Fly-In at Rockford, Illinois, from Aug. 3 to 6. Weather was generally good during the period—perhaps better than past years—and permitted a high attendance of home-builts and E.A.A. members and guests.

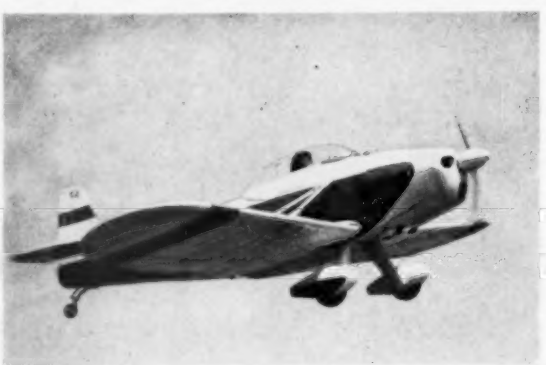
Altogether 83 home-builts were flown, towed and trucked in, including a Baby Ace and Playboy from Canada, plus three Adams-Wilson Hobby-Copters and three Bensen Gyro-Copters in various stages of construction. Ten vintage types appeared including, once again, a DH 82C from Prince Edward Island flown by Father John MacGillivray, an R.C.A.F. Chaplain.

A good number of the aircraft presented were originals designed, built and flown by the owners. However, other projects were built from plans, purchased from such sources as Stits, Wittman, Ace Aircraft, of already proven designs. In most cases, these craft were modified or refined by their builders to suit particular needs; some, for example, had folding wings for towing and home garage "hangaring," others had wings slotted for slower stalling or clipped for higher speeds, while still others were just "plushed-up" for comfort or constructed in the simplest manner for low cost.

As a general safety precaution for the whole experimental aircraft movement no aerobatics were permitted at the Fly-In although a flight contest was held which included a quick take-off, slow-flight pass, spot landing and finally an acceleration run take-off. The Rockford Chamber of Commerce which presents a plaque to the pilot flying the greatest distance in his home-built found that it had to present two this year—one for Earl Love in his "Doodle Bug" and another for Bill Warwick in his "Tiny Champ"; both flew from Torrance Airport in suburban Los Angeles, a distance of 2,176 miles.

It was originally planned to judge and award the prizes of $5,000 to the winners of the E.A.A. Design Competition during

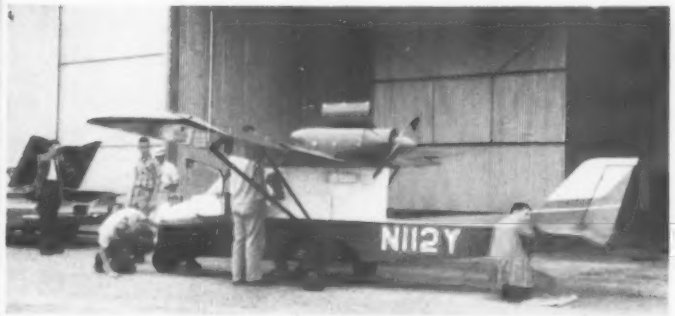




Top to bottom: Rogers-Grow Tri-Ace (65-b.h.p. Continental); cruises at 100 m.p.h. and weighs 750 lb. Bryan II (75-b.h.p. Continental) roadable aircraft; cruising speed, 80 m.p.h.; gross weight, 1,020 lb. Bowers Fly-Baby I (75-b.h.p. Continental), weighs 900 lb. all-up; cruises at 104 m.p.h. Trefethen-Stits Playboy (85-b.h.p. Continental); cruising speed, 120 m.p.h.; all-up weight, 950 lb.

Below, a 1934 two-seater, this Russert-Pietenpol (50-b.h.p. Ford) was rebuilt in 1954; it cruises at 70 m.p.h. and weighs 1,000 lb. all-up. Bottom, the two-seat Wittman W-9L (160-b.h.p. Lycoming) cruises at 175 m.p.h.; gross weight is 1,400 lb.

# DISPLAYED



Top, the two-seat Loving WR-2 (85-b.h.p. Continental) has a design cruising speed of 100 m.p.h. with an all-up weight of 1,160 lb. Above, Poberezny Pober Sport 105 (85-b.h.p. Continental); cruising speed, 115 m.p.h.; gross weight, 1,055 lb.

the 1960 Convention, but because only two entries arrived and still did not meet the full requirements of the competition, it was decided to postpone the award for two years. Actually, more than half-a-dozen projects are in various stages of construction and this new two-year period will probably permit still other designs to evolve.

The competition is open to all E.A.A. members in good standing. The design must be an original and drawings complete and clear enough to permit other amateur builders to duplicate the craft. The aircraft entered must be certified by the F.A.A. in the experimental category as amateur-built and must have logged at least 50 hours of flying time. Specifications permit the use of any powerplant and fixed-pitch one-piece propeller with an approved type certificate.

The craft must be transportable on public highways day or night without requiring special permission (it can be towable or roadable as desired by builder). The aircraft must also be capable of being transported or stored without exceeding a length of 20 ft.; width of 8 ft. and height of 7 ft. Instrumentation, dismantling, re-arranging, construction and flight characteristics must follow the normal safety requirements of a type-certificated aircraft.

The basic idea behind the competition is to develop a simple, inexpensive aircraft which will be safe and fun to fly. The theory of a towable craft permits the saving of hangar rent by storing in the owner's garage as well as permitting minor maintenance and inspection without the considerable away-from-home-and-family time normally associated with airport hangarage or tie-down. Selection will be based on a points award system which will evaluate the basic design, operating characteristics, producibility, quality of construction and drawings submitted.

Approximately 2,000 operations were reported by Greater Rockford Airport tower operators during a single day's operations—90% of which could be contributed to Experimental Aircraft Association activities—without a single accident of any sort. Rockford city and airport officials have once again extended a "come-again" offer to the E.A.A. and the 1961 Convention will be held there Aug. 2 to 5. HOWARD LEVY.

Top to bottom: Hegy Chuparosa (65-b.h.p. Continental); cruising speed 120 m.p.h.; gross weight, 725 lb. The Knight-Twister 75 (85-b.h.p. Continental) has a cruising speed of 125 m.p.h. and a gross weight of 861 lb. Mignet-Easton Flying Flea (40-b.h.p. Continental) originally built in 1945—cruising speed 70 m.p.h.; all-up weight, 750 lb. Knight-Twister KT140 (125 b.h.p. Lycoming)—cruises at 150 m.p.h. and weighs 947 lb.

# Getting A Man Into Space

SLOW progress of the Mercury man-in-space programme coupled with Russia's achievement of recovering a 4½-ton spacecraft from orbit has naturally led to a great deal of heart-searching in the United States. Once again, it is being said, the U.S. space programme has been outmatched by the Soviet ability to launch much heavier payloads and there is talk of Mercury becoming "another Vanguard."

Although in this country we may not regard it as very important which country is first to put a man into space, the "prestige factor" looms very large among those who direct the American space programme. There is already the prospect of a full-scale inquiry into Project Mercury.

There is no denying that the programme has fallen behind schedule. Earlier this year it was announced that a primate would be launched in a Redstone-boosted capsule down-range from Cape Canaveral in July and that, probably in August, a man would make a similar sub-orbital flight. It was expected that an encapsuled primate would be sent into orbit by means of an Atlas booster a month later, to be followed in the spring of 1961 by a Mercury capsule containing a man.

What has actually happened to date is that an Atlas carrying a production version of the Mercury capsule, launched on Jly. 29, suffered an explosion 65 sec. after lift-off from Cape Canaveral. The intention had been to launch the instrumented capsule 1,500 miles down the Atlantic Missile Range.

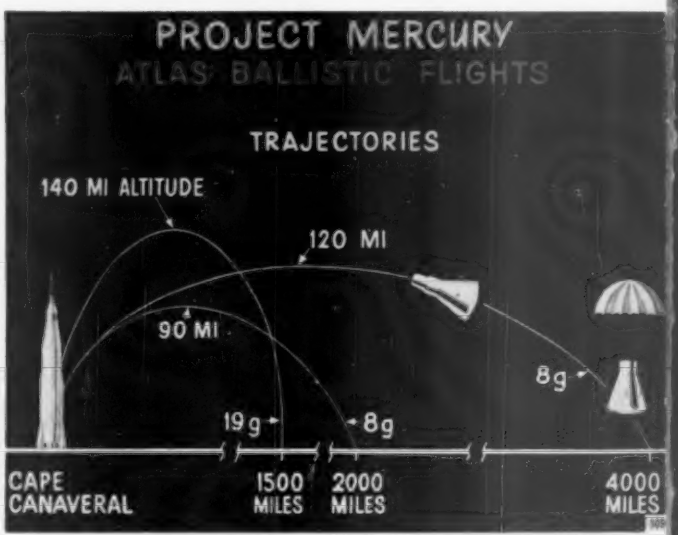
On this occasion, the escape rockets designed to separate the capsule from the booster in emergency were not fitted, nor did the capsule contain the environmental control system, stabilization and control jets, and the astronaut's couch. In view of this and other setbacks it is doubtful if one of the seven appointed U.S. astronauts will take that expected ride in a Redstone this side of the New Year.

What failures the Russians have had in developing their man-in-space programme are not known; nor until recently has there been indication of whether they intend to work up to orbital missions by first sending men on short-range ballistic flights. Certainly a great deal of preliminary work has been done with geophysical rockets in which dogs and rabbits have been sent up to heights of 100 to 300 miles and safely recovered.

The technique has been to place the test animals in the detachable head-section of the rocket and to recover this by parachute after speed has been reduced by petal-type drag brakes (THE AEROPLANE AND ASTRONAUTICS, Aug. 12, 1960). The seeming regularity with which these experiments are made —one dog, Courageous, has been up and down five times!— is an indication that the Russians could have moved on to manned experiment, as one recent report has suggested.

In June, a single-stage ballistic rocket launched one of these geophysical nose-cones to a height of about 130 miles. The Russians gave the weight of scientific apparatus, power supply and animals as 2 tons 240 lb., which is almost twice the weight of the Mercury capsule.

How recovery of Sputnik V was achieved has not been revealed in full. All the Russians have said is that the space-craft was protected by a heat shield and that, just before touch-down, the animal capsule was catapulted clear of the vehicle as a safety measure. Both components were said to have landed safely. This information gives no indication whether the entire spacecraft made a purely ballistic descent with terminal recovery of the two sections by parachutes, or whether an initial ballistic descent was modified either by the extension of drag brakes and/or the use of small lifting surfaces.



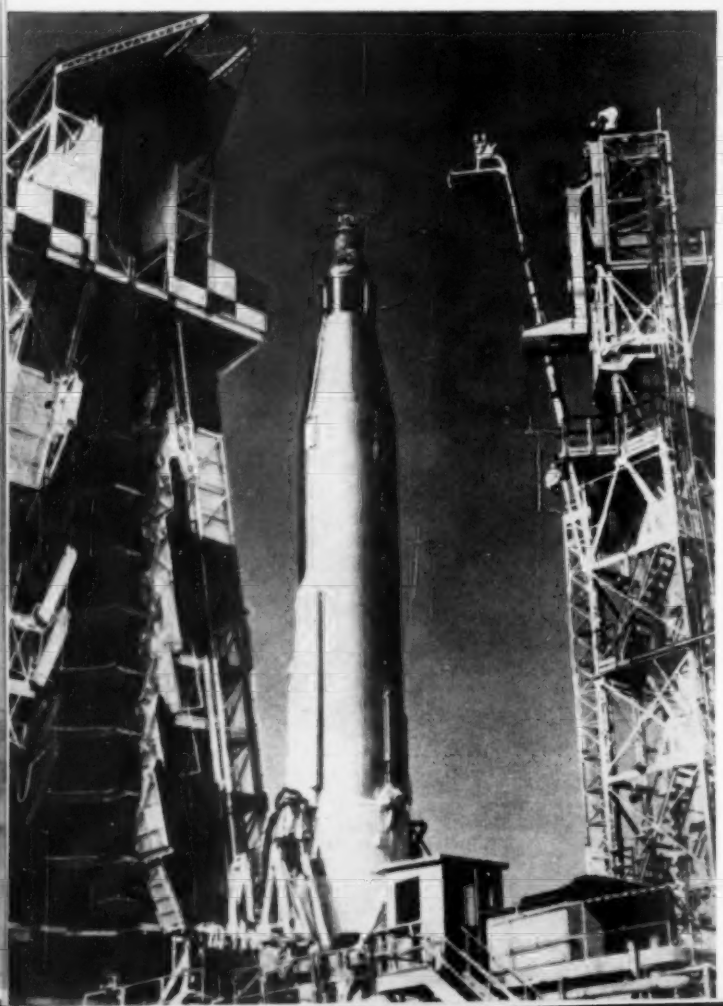

This NASA diagram illustrates various sub-orbital trajectories for the Mercury man-in-space project using Atlas as the booster.

In any case, the Soviet claim that the descent was made over land—without recourse to a global tracking network—within seven miles of a designated point, suggests a remarkable control ability.

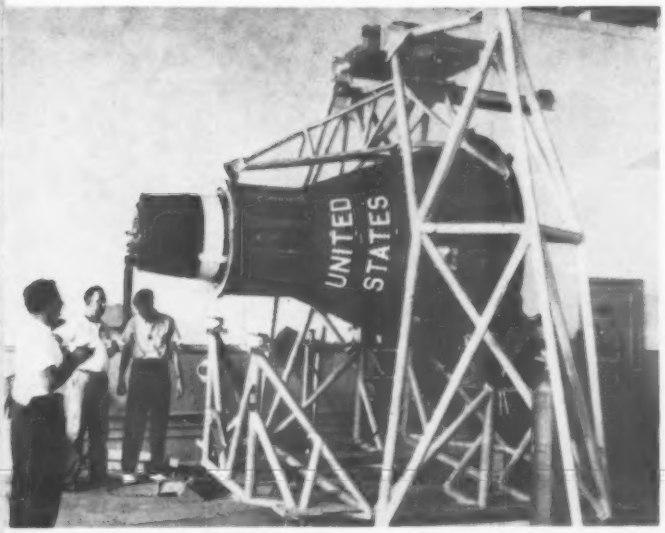
In comparison with Sputnik V, the Mercury capsule is a small vehicle and must surely be close to the smallest container it is possible to devise for a manned orbital experiment. Its weight is directly related to the performance capability of the Atlas booster.

In fact, to keep the capsule's all-up weight within specification has entailed engineering skills of a high order. And there have also been reports of weight problems in modifying the Atlas and in providing the necessary attachment fittings which support the capsule.

All this is not to suggest that the Mercury programme will not achieve its designed objectives; but if it should fail, the Americans are growing increasingly sensitive to the fact that



First production version of a heavily instrumented Mercury capsule is seen mounted on the nose of an Atlas booster at Cape Canaveral before the unsuccessful launching on Jly. 29.




The size of the Mercury space-capsule can be appreciated in this view taken at Cape Canaveral showing the capsule on a test and assembly stand.

no "bridge" exists between it and the Dyna-Soar orbital glide-vehicle (circa 1965). Rumours that a back-up programme to Mercury in the shape of a "second-generation" space-capsule may therefore be well founded, and the most likely choice appears to be the Avco "parasol" drag-brake capsule which created so much interest when it was first described in London last year during the 10th I.A.F. Congress.

It is known, for example, that the U.S.A.F. are seeking a larger re-entry vehicle than the Discoverer capsule to investigate the possibility of recovering reconnaissance equipment from orbit. Conceivably, this could be of Mercury proportions.

A novel feature of the proposed Avco re-entry device is that the capsule is surrounded by a large drag brake of variable area, designed to open and close according to a pre-set programme to achieve an optimate rate of deceleration. (THE AEROPLANE AND ASTRONAUTICS, Sept. 11, 1959, pp. 175-6.)

Launched into a near-circular orbit at a height of 105 n. miles, the orbital life-time would be about two days with the drag structure folded for minimum drag; but emergency recovery could be achieved in two hours with the drag brake at maximum spread. A unique feature of the scheme is that re-entry can be achieved without resorting to retro-rockets and gas-jet orientation simply by virtue of opening out the drag brake, with clear advantages in reliability.

Moreover, the heading of the vehicle during re-entry would be controlled entirely by the shape and large drag-area of the extended drag brake. It is considered that the small amount of residual atmosphere would exert forces on the vehicle sufficient to bring about orientation with respect to the relative air-flow.

The human occupant is intended to be supine on a contoured couch inside the life-compartment and, in the launching rocket, the supporting ribs and flexible skin of the drag brake would be folded forwards around his capsule. Covering material of the drag brake would consist of stainless steel cloth made of .001-in. 400 x 400 mesh, a layer of .0005-in. stainless steel foil cut into circumferentially aligned ribbons, and finally another layer of mesh of coarser grade.

Avco believe that such a vehicle could be produced for a total weight in orbit of about 1,600 lb., because it eliminates the need for a retro-rocket, orientation system, auto-stabilizer, conventional heat-shield and recovery parachutes (the drag brake is considered adequate to effect a landing). This compares with about 2,200 lb. for a capsule of the Mercury type. Estimates suggest that the Avco vehicle could be ready for launching by an Atlas within two years of placing a contract.

—K.W.G.

Soviet single-stage rockets have carried dogs, rabbits and research instruments to heights of between 100 and 300 miles, the payload being recovered in a detachable "nose-cone" fitted with petal-type air-brakes and a parachute. This one launched a payload of 3,390 lb. to an altitude of 295 miles on Feb. 21, 1958.

## Cooling the Re-entry Vehicle

ARTIFICIAL satellites which return from orbit at hypersonic speeds—about Mach 25—encounter considerable skin heating because of friction with the surrounding air. Temperatures of 8,000° C. or more can occur under these conditions in the air layers immediately around the body, which would burn up the skin of any known material. Meteors (shooting stars) which heat up to incandescence or even completely vaporize are an example occurring in nature.

Various methods of overcoming this problem have been investigated during the past few years, mostly in the category of so-called mass-transfer cooling. One such scheme is transpiration cooling, where a light gas, such as helium or hydrogen, foreign to the surrounding atmosphere, is injected through the porous walls. Another is ablation cooling, where the outer layers of the wall—made of glass fibre or ceramics, for example—melt and vaporize, the walls being made of such thickness that sufficient material still remains to form the structure after the vehicle has re-entered. This is the technique used in the Discoverer re-entry capsule and in the re-entry shield that has been developed for the full-size Mercury space-capsule.

A new cooling method has recently been discussed* by Dr. Rudolf Hermann, Professor of Aeronautical Engineering at the University of Minnesota, who has been investigating theoretically and experimentally a process called "evaporative film cooling." In principle, this consists of a one-spot injection of an evaporative liquid coolant such as water near the stagnation point (front portion) of a blunt body, such as a fuselage, or the blunt leading-edge of a re-entering hypersonic glider.

The coolant forms a very thin (0.025-mm.) film which is kept small by virtue of the high shear force exerted by the vehicle's hypersonic speed. The film evaporates automatically according to the local heat transfer condition.

Feasibility of the system has been demonstrated to Prof. Hermann's satisfaction in the University of Minnesota's hypersonic wind-tunnel. As an example, the front portion of a blunt body (hemisphere) can be kept at a temperature of about 50° C., when the local stagnation temperature of the air is about 2,000° C.

Characteristic ice formation was observed to develop along the cone and the cylinder bodies in the wind-tunnel. This is caused by a condensation and/or sublimation of the water vapour, initially produced along the front portion of the body by the heated air.

In the opinion of Prof. Hermann, the film-cooling method will have many applications for re-entering hypersonic vehicles and offers the following advantages: First, the skin of the spacecraft and its underlying structure are kept at a uniformly low temperature; this is of great importance for human passengers and for most instrumentation. Second, the avoidance of thermal stresses in skin and structure will permit simpler and light construction. Third, the aerodynamic shape and wing leading edges are preserved, ensuring correct lift and control during the descent of a hypersonic glider from Mach 25 to the landing, and not distorted by ablation.

* "Evaporative film cooling of blunt bodies in hypersonic flow and its application to re-entry vehicles." Presented at the 11th I.A.F. Congress, Stockholm, August, 1960.

# Controlling the Douglas Delta

FOLLOWING the success of the balloon-satellite Echo I, more information has been released on the control system of the three-stage Delta rocket which carried it into orbit on Aug. 12. The vehicle is a variant of the successful Thor-Able, differing mainly in the provision of a lightweight flight control system to provide an orbit which varies no more than 100 miles between perigee and apogee. A contract to produce 12 of these vehicles for NASA was signed by Douglas Aircraft Company in April, 1959.

First stage of the Delta rocket, adapted from the Thor IRBM, is produced at the Santa Monica Division of Douglas Aircraft Co. and then transported to Cape Canaveral where the second and third stages are added. These last two units are manufactured at the Douglas Tulsa division.

The flight controller achieves its accuracy largely by means of a gyro control system which is held to a drift rate of 1/10 of a degree per hour—a substantial improvement over previous systems. The unit can be adjusted to provide a wide range of flight paths, from near-circular to elongated orbits, or even to deep-space trajectories. Other adjustments possible include varying the coasting period between "all-burnt" and ignition of subsequent stages, attitude commands, and the sequence of events (e.g. spin-up of the third stage). All this can be achieved simply by electronic switching.

By means of a timer, signals can be applied through 16 sequence outputs at ½-sec. intervals from zero to 2,048 sec. This permits accurate control of the vehicle's attitude and pitch and yaw manœuvres, and also ensures correct ignition of the rocket stages.

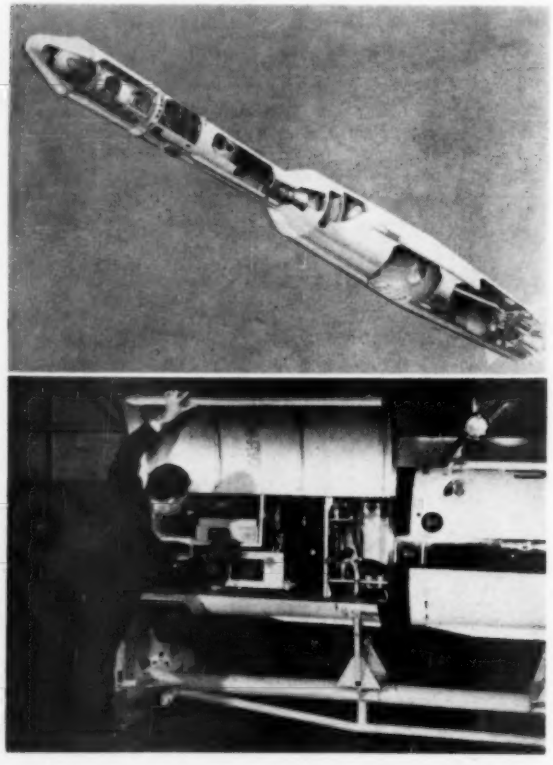
The flight controller, located in the second stage of the Delta vehicle, is an adjunct of the Bell Telephone Laboratories radio guidance system during the thrust period of the first and second stages. It comes into its own after cut-off of the second-stage engine and the ending of radio guidance. From this point the vehicle's attitude and the entire sequence of events during the 15-min. coasting period, second-stage separation, and third-stage injection into orbit, are all controlled by this unit.

Four American companies contributed to the design of the flight controller. Minneapolis-Honeywell designed and built the improved gyro system and Texas Instruments developed the transistorized programmer. The static inverter, which supplies 400-cycle AC power with .01% frequency regulation, is a product of the Electrosolids Corporation. The electronics package was designed and manufactured by the Douglas El Segundo division.

**DELTA TECHNICAL DATA**

| | First stage (Thor SM-75) | Second stage | Third stage |
|---|---|---|---|
| Height .. | 60 ft. | 17 ft. | 5 ft. |
| Max. diameter | 8 ft. | 3 ft. | 2 ft. |
| Launching weight | 109,000 lb. | 4,700 lb. | 500 lb. |
| Engine .. | Rocketdyne MB-3 liquid propellent | Aerojet-General AJ10-118 liquid propellent | Allegany Ballistic Laboratory X-248 solid propellent |
| Thrust .. | 150,000 lb. × 160 sec. | 7,500 lb. × 115 sec. | 3,000 lb. × 40 sec. |
| Guidance .. | Thor autopilot and Bell Telephone Laboratories radio guidance | BTL radio guidance (during powered flight); Douglas flight controller (during coasting period) | Spin-stabilised |

Overall length, 92 ft.; total launching weight, 114,700 lb.; payload, NASA's Langley Research Center 100-ft. dia. inflatable balloon satellite Echo wt. 240 lb.



Top, first cutaway drawing of the Douglas Delta. Bottom, an engineer inspects the "guidance bay" situated in the top of the second stage; this compartment houses the BTL radio guidance receiver and the flight controller which programmes the rocket's trajectory after cut-off of second-stage thrust.

# A New Aerobee

STELLAR and solar observations are being conducted by NASA using a new variant of the Aerobee rocket at Wallops Island, Virginia. Designed and manufactured by Aerojet-General Corporation, this vehicle—known as Aerobee 150A—can carry a payload of 160 lb. to an altitude of 150 miles.

Like its predecessor, Aerobee-Hi, the new rocket is a tower-launched, free-flight, fixed-fin rocket employing a solid-propellent booster and a liquid-propellent sustainer engine. The latter has a helium pressurization system and a regeneratively cooled thrust chamber. Design changes include the use of four fins instead of three, a different type of fin construction to reduce weight, redesigned valving to start the sustainer engine, and remodelled tanks to permit the vehicle to be held in readiness for longer periods.

Launching facilities at Wallops Island comprise a launching tower, ready room and equipment and propellent buildings; they are linked together by tunnels.

# Balloon "Drag Brake"

COATED fabric balloons which inflate in 1/10 sec. have been developed for a high-altitude recovery system designed to control the deceleration of re-entering space-vehicles. The technique has been evolved by Goodyear Aircraft Corporation for the United States Air Research and Development Command's Wright Air Development Division.

The spherical drag balloons, called "ballutes," will be used to prevent tumbling and to control the re-entry speed of instrumented nose-cones, manned escape capsules and other space-vehicles. A parachute is ejected at lower altitudes to complete the recovery.

It is proposed to evaluate the recovery system in a series of test-firings with Cree missiles, specially modified for the purpose. The first is expected to reach a velocity of Mach 2.0 at 150,000 ft. and the second Mach 3.0 at 200,000 ft. During these experiments, the 9-ft.-diameter "ballute" will be deployed and inflated behind the missile.

Once the test-vehicle is stabilised, the balloon will reel out automatically until it reaches the flow region appropriate to maximum drag. When speed has been sufficiently reduced, at the prescribed lower altitude, final recovery will be effected by parachute.

Goodyear have announced that during wind-tunnel experiments of ¼-scale models at the Langley Research Center, Virginia, and the Lewis Research Center in Cleveland, Ohio, balloons were tested at simulated altitudes of 155,000 ft. and speeds approaching Mach 3.5. The tests involved ejection, inflation and deployment of the drag balloon configuration under high-speed flow conditions. They showed that the balloons were stable in subsonic, transonic and supersonic flow régimes.

# Flying the Hiller UH-12E

by John Fricker

HELICOPTER flying, largely because of its considerable expense, is difficult to come by for the non-professional pilot, which is why my total solo experience on rotary-wing types is limited to a couple of hours on the Westland S-51. I have handled quite a few other types, although not for some considerable time, since my first helicopter initiation some ten years ago, on the Hiller 360 in Paris, with Alan Bristow. I was therefore particularly interested in renewing acquaintance with its latest form, the UH-12E, during its current U.K. visit.

Having explained my inadequacy to talk about helicopters with any authority, I propose to give some handling impressions of the UH-12E, with particular reference to the improvement in performance during its long development. This increase has been accompanied by improved handling, without recourse to power-boosted controls, and an all-round betterment of utility, in the course of producing about 1,200 of the basic series.

Some impressions of the interim stages of this development were gained in 1956 at Hamble, in the course of a couple of hours' dual on the Hiller UH-12B, which like the earlier model 360 (UH-12A), was powered by a Franklin engine, of 200 instead of 178 b.h.p. From the UH-12D onward, however, the powerplant was changed from Franklin to Lycoming, initially of 250 b.h.p., and now, in the UH-12E, of 305 b.h.p., giving a very useful power margin. As I was shown by Bob Boughton, Hiller export sales manager, it is now virtually impossible to overpitch the UH-12E, which will also climb away without sinking from any hovering condition.

But the UH-12E incorporates more than just a bigger engine, and has such features as a new transmission system, thicker-gauge airframe skins, and internal fuel tanks of 38, instead of 20 Imp. gal. capacity. Its low-compression VO-540-B1A flat-six engine uses a minimum of 80 octane fuel, which may be supplemented by auxiliary 17 Imp. gal. tanks on each side of the central pylon structure. These external tanks are of the "plug-in" type, and can be attached in less than a minute, while their attachment points double with those of the agricultural equipment.

*Photographs copyright "The Aeroplane and Astronautics"*

Basic instruments are accommodated on the central console of the UH-12E, with Collins VHF selector boxes above. The military-type handgrips carry switches for winch, RT, landing light, trim and other controls.

In all, there are now some 25 sets of accessories for the UH-12 series, which virtually conforms to the idea of an aerial tractor in being adaptable to a very large number of jobs. Attachment points are provided for a small 250-lb.-lift winch, which can also be plugged in in a matter of half-a-minute or so, and there is a cargo hook beneath the fuselage, with a maximum capacity of 1,000 lb.

Other improvements in the UH-12E, as in the "D," include relocation of the tail-rotor blades from the starboard to the port side of the rear boom, to eliminate the former "buzz" or interference vibration, and a bigger hub system. The tail rotor pitch-change links have nylon-type bearings, and further attention to simplified maintenance is apparent in many similar points of detail. All oil seals can be changed externally, with the minimum of disassembly, and the UH-12E is already cleared for a first major overhaul, including gearbox and engine, at 750 hours for civil use.

Like the earlier "D," the UH-12E has all-metal rotor blades, with an initial life of 2,500 hours, and extended 3-in. tips. Control of the Hiller tetering rotor head is exercised through the "paddles," which also act as stabilising surfaces, and the streamlining of their attachment spar, with a facing of wing walkway material to act as turbulator, is reckoned to restore the equivalent of 3 b.h.p. in drag reduction.

The 10° negative twist on the rotor blades is responsible for the Hiller's excellent translational lift characteristics, and for the fact that it is licensed for climb-away performance with only a 2-ft. clearance between its skids and the ground, instead of the customary 4 ft. This was determined by loading the helicopter in calm air until it would no longer lift off the ground, and then subtracting 10 lb., which gave an overload weight of 4,360 lb., compared with the current licensed figure of 2,750 lb.

These facts were gained during a prolonged walk-round of demonstrator N5376V with Bob Boughton at the Battersea heliport, while waiting for early-morning mist to burn off for a flight to Redhill. Other points noted included the fixed stabilizing surface on the tail boom, with two ground-adjustable positions for skid or pontoon undercarriages, and the big glass-fibre air-intake trunk for the carburetter, containing a couple of very effective folded paper dust-filters.

In the cabin, the bench seat for three people and the central console with its basic instruments were very much as I remembered them in earlier Hillers, as were the main rudder pedals on each side of the panel column. Dual stick, pedals and collective pitch lever were installed on the left for training and demonstration, with the big moulded military-type Mason handgrips on the control columns, incorporating trim, winch, landing light, RT and sundry switches. Prominent at the base of the control pedestal was an electric cigarette lighter, with a business-like ashtray on each side.

From the left-hand side of the bench seat, I enjoyed a

wonderful panoramic view through the cabin bubble, as we lifted off the heliport and flapped our way westwards low along the river in the approved exit lane. This involves leaving the Thames at the M.W.B. reservoirs near Chiswick at not more than 500 ft. and turning south over Richmond Park, continuing over a relatively green strip of country towards Epsom, until clear of the London area. At 800 ft. or so by then, we were still very close to the undulating countryside and such intimate proximity, when speeding along at 85 m.p.h. or more, reminds one that the helicopter is a most agreeable method of locomotion, as well as a versatile tool.

General impressions in cruising flight of the UH-12E were primarily of its quite reasonably low noise level and good stability, except for a slight tail wag on one occasion when speed was increased to 95 m.p.h., which is the normal never-exceed figure. I noticed that we reached 97 m.p.h. on the let-down to Redhill, with no adverse effects, before touching-down briefly to drop off our third passenger prior to a demonstration of UH-12E capabilities. For five minutes or so, Bob Boughton made the little Hiller do everything except talk, although the spectacular aspect of his performance arose almost incidentally from points of technical interest.

As a demonstration of the excellent co-ordination of power with collective-pitch lever movement, as well as the wide operating range of rotor and engine, I was first shown a complete circuit, from take-off, hover, cruise, autorotation, and back to hover and landing with the twist-grip throttle locked and immovable. Elimination of throttle adjustment during manœuvres involving constant alternations of collective-pitch is one of the biggest savings in training time, especially where turbine-powered rotorcraft, with constant-speed characteristics, are later to be flown.

Normal operating range of the UH-12E rotor is between 320 and 400 r.p.m., with corresponding engine limitations on the common tachometer of 2,900 and 3,300 r.p.m. To demonstrate the impossibility of overpitching, Bob Boughton reduced pitch and power while hovering just above the ground until the Hiller was almost stalled out at 2,350 r.p.m., before raising the collective-pitch to its full up position and climbing away out of the ground cushion.

Other points shown included brief hands-off stability at the hover, after longitudinal and lateral trimming via the thumb-button (which applies spring bias accordingly), on the stick; and a vertical climb approaching 2,000 ft./min. at our light weight, with turns in each direction en route. With its good power margin, the UH-12E apparently shows little difference in performance between inclined and vertical climbs, although the rates are naturally sensitive to load.

On taking over for some brief general handling at Redhill, I was immediately impressed with the responsiveness and precision of the cyclic stick, rudder pedals and throttle, with the collective-pitch lever equally positive but, as usual, less sensitive. With the built-in power co-ordination, it was easy to keep the revs. in the centre of their operating arc at about 360 and 3,100 r.p.m. for take-off and hover, with a little left rudder to keep straight on raising the pitch lever.

Although out of practice, I found little difficulty in keeping the UH-12E over approximately the same piece of ground at the hover, despite the usual tendency among inexperienced helicopter pilots to over-control. Very small movements of the stick are needed in hovering flight, for which the art seems

This wide-angle photograph of Hiller's Palo Alto plant, from the rear seat of a Model E-4 gives an excellent idea of the panoramic view proffered by the bubble canopy.

to be the anticipation, rather than the correction, of sideways, backward or forward drift. Moderate control forces assist in reducing fatigue at this stage of extreme concentration for the student helicopter pilot.

For the climb-away, raising the pitch lever to 25 in. Hg. or more manifold pressure according to load, height or temperature, and pushing the stick forward to accelerate to about 50 m.p.h. necessitates slight nose-down trim on the thumb switch, although trim changes are not particularly pronounced at any time. On straightening out for cruising flight, still at 360 and 3,100 r.p.m., and 19 Hg. manifold pressure (selected, as always, by pitch lever position), there is a slight rolling tendency to the left, because of asymmetry of rotor lift at increasing speeds, but this may also be cancelled by a blip of the actuator switch.

When cruising, the UH-12E burns 90-120 lb. of fuel per hour, according to power settings, the fuel gauge being calibrated by weight rather than capacities, as in military and airline practice. This enables direct computations of load to be made without complicated mathematics. At its most economical setting, however, the Hiller is using only about 12½ Imp. gal. per hour; normal cruise consumption is about 15 g.p.h.

Vibration level is not excessive, the usual two-per-rev. low-frequency oscillation from the main rotor being the most apparent. Perhaps the best tribute to the Hiller's pleasant flying qualities was provided by Bob Boughton, who admitted that in less than two months he had completed nearly 300 hours in demonstrating a consistently overweight UH-12E throughout the length and breadth of South America.

Among the many achievements of the helicopter in extreme conditions, one of the most notable seemed to me the routine operation of the UH-12E from the roof of the crew's hotel in Bogota, nearly 8,000 ft. above sea level, because of a surface transport problem to the local airport. Earlier this year, a UH-12E also operated on several occasions at more than

*Photograph copyright "The Aeroplane and Astronautics"*

Hiller helicopters are normally flown solo from the central position on the bench seat, but there are no lateral restrictions on C. G. position.

A simple cabin extension to the UH-12E results in the four-seat E-4, which is built with a dual-carburetter engine developing 323 b.h.p. Existing 12Es may be converted to E-4 standard.

18,000 ft., with two persons on board during rescue sorties on Mt. McKinley, Alaska. High-altitude performance is being further increased by the current introduction of dual Marvel-Schleber carburetters and high-compression pistons, each modification providing an increase of 18 b.h.p. With both kits installed, hover ceiling increases to 11,500 ft. in ground effect, and 8,000 ft. outside, the service ceiling becoming 17,000 ft.

In all helicopters, much larger control movements are needed in cruising flight than during the hover for changes of attitude, but response in the UH-12E remains brisk and precise throughout. Because it is possible to operate at lower percentages of power at all times than in many other types, the usual yawing tendency with different throttle settings is less pronounced. Turns can be made simply by pushing the stick in the required direction, and stability seems just about neutral all round.

Pushing the collective-pitch lever right down for autorotation necessitates some right rudder to keep straight, and the minimum rate of descent in this condition, of about 1,500 ft./min. is achieved at 50 m.p.h. or so. For training purposes, it is possible to close the throttle twist grip past a detent to avoid adding power when raising the pitch lever during the last 10-15 ft. to cushion the descent, after a cyclic flare at 50-75 ft., to reduce forward speed to zero. Run-on autorotation landings may also be made on the skids.

Despite its many modifications, bigger engine, and such additions as a rotor brake, the UH-12E is some 55 lb. lighter than its predecessor, and with a U.S. basic price of $55,950 has proved very popular. During the past 18 months, some 90 have been built and sold.

The E-4 is simply converted from the UH-12E by a 25-in. extension of the forward cabin, to carry a single front seat for the pilot, in addition to the normal bench seat. This modification is being made available in kit form.

Hiller claim the highest load factors of any commercial helicopter with their factor of two on the normal F.A.A. rotorcraft requirement of $+1\frac{1}{2}g$, and their machines are also stressed to $4g$ for the landing case. While the utility and economy of Hiller helicopters can be judged to speak for themselves from the information contained in these pages, their safety aspect may be illustrated by the fact that in the U.S. Army their accident rate is 18 per 100,000 hours, compared with the overall rotorcraft total of 55 for the same period.

### LEADING PARTICULARS

**Dimensions.**—Main rotor diameter, 35 ft.; fuselage length, 28 ft.; height, 10 ft. 1½ in.; main rotor disc area, 985 sq. ft.

**Weights.**—Empty, 1,700 lb.; fuel, 276 lb.; oil, 17 lb.; residual fuel and oil, 9 lb.; pilot, 170 lb.; cargo or passengers, 578 lb.; useful load, 1,050 lb.; max. gross, 2,750 lb.

**Performance** (at max. gross).—Max. speed, 96 m.p.h.; cruising speed (max. range), 84 m.p.h.; cruising speed (max. endurance), 54 m.p.h.; max. climb, 1,340 ft./min.; service ceiling, 13,600 ft.; hovering ceiling (in ground effect), 8,450 ft.; free hover ceiling, 4,500 ft.; range, 242 miles; endurance, 3.2 hours.

# Personal Flying

LEON BIANCOTTO, whose death in the recent aerobatic championships in Czechoslovakia we reported a week or two ago, will be remembered as one of the most outstanding figures in the post-War international sports-flying scene. Unrivalled as an aerobatic pilot, he was three times winner of the British Lockheed International Aerobatic Trophy, and his impeccable flying became a familiar feature of the event.

He won the first Lockheed Championship in 1955, flying a Stampe biplane, and followed this with another victory in the next year's event, in the Stampe et Renard monoplane. In 1957 he flew the S.R.7 into second place, but won once again in 1958 in a Czech Zlin Trener. He was unlucky in subsequent Lockheed events, including this year's, in which he again flew a French Air Force Nord 3202 trainer.

Biancotto achieved many other successes in Continental contests since his introduction to flying at St. Yan in 1952, and was winner of the first Coupe Marcel Doret in 1957. He was also holder of an unofficial record for inverted flight, with a time of 1 hr. 15 min., and flew the English Channel in this fashion. He was virtually a professional aerobatic pilot, and his training included long periods spent strapped into a chair suspended inverted on a rig at his home in Paris.

The unassuming and affable manner of this 33-year-old pilot gained him many friends in several countries, and his sportsmanship was such that he trained and assisted a number of British pilots in advanced aerobatics. That his skill was not restricted by the type of aircraft he was using was shown by his brilliant impromptu handling of the Bishop Tiger Moth, when allowed to fly it at Coventry, in a display which impressed all who saw it. It was all the more tragic that his death in Bratislava during the practice period was apparently not through an error of judgment or mechanical failure, but simply the result of non-recovery of his Nord aircraft from an inverted spin—one of the mandatory manœuvres in the competition.

• • •

Air freighting of light aircraft across the Atlantic has become a routine method of delivery for Grantair, Ltd., of Cambridge, which offers aircraft on a contract-hire long- or short-term basis. This method of delivery obviates the necessity for crating the machines after disassembly, and also eliminates the damage from rough handling.

The aircraft, comprising mainly Tri-Pacers, are flown into

QUICKER BY AIR.—Loading a Piper Tri-Pacer on board a PanAm DC-7F freighter for transport to the U.K.

Boston, Mass., for disassembly, and loaded aboard a PanAm DC-7F freighter for the 15-hour flight. They are unloaded at L.A.P. straight on to a transporter, and can be reassembled within 24 hours of leaving the U.S. In fact, it is possible to have a light aircraft operating on a hire and reward C. of A. in the U.K. within seven days of it having completed flying in the United States.

Several Austers have also been hired out by Grantair, for trips as far afield as Ghana and India.

• • •

More details are now available on the converted A.O.P. Austers 6s, which were mentioned in our first report on the S.B.A.C. show. Completely overhauled and modified by Auster Aircraft to conform with civil licensing requirements, the Auster 6A has the taller fin and rudder of the Alpha series, restricted flap travel, and other improvements, and has been designated the Tugmaster.

This name indicates its suitability for glider-towing, for which it is mainly intended, and was so demonstrated during the public days at Farnborough. With its Gipsy Major 7 engine, the Tugmaster can tow a two-seat sailplane to 2,000 ft. in about 6½ min., which compares with about 14 min. for the commonly used Tiger Moth. For single-seat sailplanes, comparative times to 2,000 ft. for the Tugmaster and Tiger Moth are 3½ and 8 min.

As was shown at Farnborough, the Tugmaster makes light of

## *Personal Flying . . . .*

towing two gliders simultaneously, with a combined weight of 1,500 lb., and these can be of dissimilar types, no special technique being required. Since operating costs are generally similar to the Tiger Moth, virtually double the tow capacity can be obtained for no increase in expense. First cost of this two/three-seater is also low, at less than £1,000.

Leading particulars of this 1,900 lb. gross aircraft include take-off run, 98 yd.; to 50 ft., 234 yd.; initial climb, at 55 m.p.h., 780 ft./min., at 70 m.p.h., 810 ft./min.; max. speed, at 2,550 r.p.m., 123 m.p.h.; cruising speed, 108 m.p.h.; economical cruise, 102 m.p.h.; consumption, 6¼ g.p.h.; stalling speed, flaps down, 33 m.p.h.; service ceiling, 14,000 ft.; range, 345 miles; landing run, 80 yd.

• • • •

Three of the five Piaggio P.166s now operating in the U.K. are owned by McAlpine Aviation, the Piaggio Spares Concessionnaires, at Luton. They comprise G-APYP, which is being operated by Messrs. John Laing; 'PSJ, on bare hull charter to the Marley Tile Co., and based at Biggin Hill; and 'PWY, taken over on the abandonment of executive flying by the John Blackwood Hodge Co. The remaining two British P.166s are United Steel's 'PXK and the Earl of Derby's 'PVE.

• • • •

A recent count of subsidized flying clubs in India totals 16, which together fly up to 3,000 hr. per month. Government and club-owned aircraft in service amount to about 127, and there are about 50 full-time instructors.

PRIVATE OWNER.—At Renfrew recently, Jimmy Logan, the Scottish comedian, took delivery of a second-hand Gemini. Here he receives the log-books from Mr. P. S. Clifford (right) of Peter Clifford and Co. of Oxford.

On January 1 this year, there were 520 aircraft on the Indian civil register, of which 179 had valid Cs. of A. Of these, nine were Super Constellations and one was a DC-3 of Air India International, while there were 57 DC-3s, 12 Vikings, 10 Viscounts, seven Herons, six DC-4s and three single-engined aircraft in the Indian Airlines Corporation fleet.

# *Gliding Notes*

*by Dr. A. E. Slater*

WHEN all training was done on primary gliders, with the pilot sitting out in the open on a "bucket" seat, people often wondered what the true performance of such a machine could be. Anything less than 8 ft./sec. sink would suffice to pass the "A" test from a catapult launch off Dunstable Downs, but an average sink of 4 ft./sec. for the "B" could only be achieved with a wind blowing up the hill.

Now the French journal *Aviasport* gives actual performance figures for the Avia 11A, similar to the German Zögling and produced in quantities from 1931 onwards. Its minimum rate of sink was 5 ft. 3 in. per sec. and best gliding angle 1 in 8.5, with a span of 34 ft. 6 in., aspect ratio 6.1, and wing loading 2.36 lb./sq. ft. The polar curve shows best gliding angle at 33 m.p.h., minimum sink at 27 m.p.h., and complete stall at 20 m.p.h.

The 15A, with a 40-ft. span and a nacelle for the pilot, but otherwise similar, had a gliding angle of 1 in 11½ and minimum sink of 3 ft. 9 in. per sec.

* * *

FROM Swanton Morley to Lympne is 115 miles in a straight line from north to south. But when Alfred Warminger flew his Skylark 3 from one place to the other on Sept. 5, he had to deviate 15 miles west to cross the Thames from Southend to Sheerness, whereas he had hoped to make a S.S.E. course to Dover and beyond, cutting across the North Sea from Essex to Kent and then the Channel.

The reason for this optimism was that cumulus tops had been forecast to reach 10,000 ft. But in fact the cloud bases were uncomfortably low at 2,500 ft., and also he could not get above 5,200 ft. Moreover, he saw from Southend that Kent was "sparsely populated with flat cumulus" and it was a struggle to cross it at all.

Warminger just managed to scrape into Lympne, where the only welcome he received was from the Kent Gliding Club, as the controller decided to report him for : (a) not having flown over and inspected the signal area; (b) not having waited for a green light before landing; and (c) turning in to land right-handed, not left-handed.

It was during National Gliding Week that Warminger had his last brush with the Law. Nine sailplanes from Dunstable had landed on Caister beach, and the local constable "proceeded" thither to take the names and addresses of "low flying" culprits. He got down two, then found that the third was Warminger, well known to the police as the county sheriff. Taken aback, he proceeded to the next pilot, whose name turned out to be Peter Scott. After that he gave up.

However, as Warminger says, we may yet see a sheriff in the dock.

* * *

AT the Kronfeld Club, Flt. Lt. Gordon Rondel had more to say about his cu-nim flight to 30,100 ft., which has already been reported here. Between 20,000 and 30,000 ft. he found that, when circling, he could not prevent his nose from pointing gradually more and more steeply downward, so whenever this happened he would stop turning and fly straight, whereupon he was able to bring the nose up again. He would then resume circling until the same thing happened again.

After much subsequent cogitation, Rondel concluded that the feeble elevator control was caused by a reduction of the Reynolds Number, due to: (a) reduced density of the atmosphere at that height, and (b) the small chord of the elevator compared with that of the wing. The remedy is, apparently, to increase the mean chord of the elevator.

It is odd that this phenomenon, if true, has not been discovered before. Maybe nearly all sailplanes which go up high nowadays have elevators with bigger chords, and in the days when small elevator chords were characteristic of nearly all high-performance sailplanes, the World's altitude record had not yet reached 20,000 ft.

Another effect of increasing altitude, he said, is to lower the angle of incidence at which a wing stalls.

An innovation in circling technique, as far as I know, is Flt. Lt. Rondel's "race track" figure. You fly along alternate straight lines and semi-circles, and gain the advantage of a higher rate of climb when flying straight. The area of lift must, of course, be large enough to contain the "race track."

A visitor to the Kronfeld Club the same evening was Ernst-Günther Haase, who had been attending the Farnborough Show. Questioned about the plastic Phönix, he pointed out that the one he flew in the World Championships was old, and admittedly did not handle well. But the lessons learned will be incorporated in the new model.

Haase had a simple explanation of why, in the Oerlinghausen race during the Championships, Adam Witek went fastest in the Standard Class Foka. The two Polish Zefirs were flying along side by side under a cloud street, and one was usually higher than the other. All Witek had to do was to keep behind and follow the one which temporarily had the best lift. As a result he made his final glide-in from a greater height and consequently at a faster speed than either of them.

* * *

THIS year's National Aerobatic Contest, organized, as usual, by the London Gliding Club, is on Sunday, Sept. 25, at Dunstable Downs. It will start about 11.30 hrs. and finish about 16.30 hrs.

# Aviation News in General

**NEW POWERPLANT.**—General Electric Company is developing a 50,000 lb. s.t. plug nozzle engine for flight testing under contract with NASA. At the company's Malta Test Station, Schenectady, N.Y., a short truncated plug nozzle has performed almost as efficiently as the longer, theoretically ideal, convergent-divergent nozzle; also, by varying combustion pressure in the segmented combustion chambers which ring the central "plug," good steering characteristics have been demonstrated.

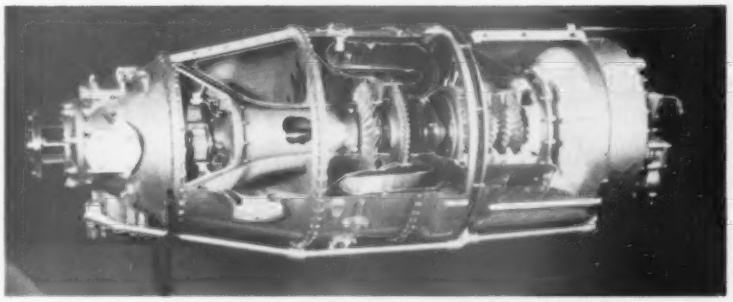
**B-26 EXECUTIVE.**—Latest in a series of Douglas B-26 Invader conversions for executive use is the Silver Sixty, engineered by Rhodes Berry Co. of Los Angeles. Using the original B-26 wing and tail, the Silver Sixty, now in initial flight testing, has a new deepened fuselage to give 6.5 ft. headroom in the 14-seat cabin. With CB-16 engines, the speed goes up to 365 m.p.h.; standard R-2800s give a cruising speed just above 300 m.p.h.

**CANADIAN ALBATROSSES.**—CSR-110 is the designation given to the Grumman Albatross amphibian by the R.C.A.F. The first of an order for 10 should be delivered soon. The R.C.A.F. Albatross will differ from American versions by having more powerful engines, and a nosewheel designed for beaching the aircraft. The Albatrosses will replace Canadian-built PBY-5a Cansoes, now used for search and rescue work.

**FLYING-BOATS AGAIN.**—Crane Aviation, Ltd., of Kitchener, Ont., have applied for an Air Transport Board licence to fly fish between several Newfoundland fishing villages and Western Ontario. Three Short Solents would be used.

**NUCLEAR ROCKETS.**—Allison Division of General Motors Corpn. is one of four American companies involved in joint studies of a nuclear rocket propulsion system. The work is being done under a $500,000 U.S.A.F. contract placed by the Air Research Development Command.

**DOUBLE POD.**—Convair has developed a two-component pod for carriage by the B-58 Hustler, which hitherto has carried a single pod containing a nuclear weapon and fuel for the outward flight. The two-component pod comprises a lower fuel tank, dropped when the fuel has been used, and a smaller nuclear bomb pod; for the return trip, the B-58 flies "clean" and uses internal fuel. B-58 Nos. 4 and 38 of the original test batch are being modified for two-component pod testing.



CANADIAN POWERPLANT.—A cutaway of the Canadian Pratt & Whitney Aircraft PT.6 turbojet/turboshaft powerplant. It weighs 250 lb. and has the U.S. military designation of T74.

**SAFETY SEMINAR.**—The 13th annual international air safety seminar of the Flight Safety Foundation will be held in Phoenix, Arizona, from Nov. 14 to Nov. 18.

**AVIATION ARTISTS SHOW.**—Air Chief Marshal Sir Thomas G. Pike, Chief of Air Staff, was to open the Society of Aviation Artists Exhibition at Guildhall, London, E.C.2 on Sept. 21. This, the society's 7th Annual Exhibition, will be open daily from 10.00-17.00 hrs., including Saturdays, until Oct. 8. Admission free.

**AERONAUTICAL GALLERY.**—The National Aeronautical Collection at the Science Museum, South Kensington, will be closed to visitors from Monday, Oct. 3. The Collection, at present housed in the Western Galleries, Imperial Institute Road, is to be reorganized and installed in the new centre block of the Science Museum during 1961.

**CHANGE OF NAME.**—The Northern Aluminium Co. Ltd., will in future be known as Alcan Industries Ltd. The new name "involves no change of ownership, manufacturing or sales policy" but is intended to indentify the company as a member of the Aluminium Limited of Canada enterprise—which is universally known as "Alcan".

**SPACE RESEARCH.**—In the fiscal year 1961, the United States has budgeted $900,000,000 for space research and development, double the amount allocated to the research and development of military aircraft and their associated equipment.

**NASA LECTURE.**—A paper of particular astronautical interest surveying rocket and satellite projects—including lunar and planetary missions, and manned spaceflight—will be presented before a special meeting of the British Interplanetary Society on Oct. 1 by Mr. Morton J. Stroller, assistant director, NASA Satellite and Sounding Rocket Programmes. Venue is Caxton Hall, Caxton Street, S.W.1. The lecture, entitled "The NASA Spaceflight Programme," begins at 18.30 hrs. and is open to visitors.

**SEA DROP.**—The instrumented capsule ejected from the satellite Discoverer XV on Sept. 14 descended into the Pacific Ocean and was sighted "bobbing about" in rough seas some 200 miles north of Christmas Island and 740 miles south of Hawaii. Launched by a Thor-Agena rocket from Vandenberg A.F.B. on Sept. 13, it was the third consecutive successful return of a Discoverer capsule from orbit.

**SPACE ALTIMETER.**—A contract to provide a radio-altimeter for the Ranger spacecraft lunar capsule has been awarded to Ryan Electronics, a division of Ryan Aeronautical Company, of San Diego, California.

# Commercial Aviation Affairs

**AUSTRIAN HERALDS?**—Purchase of two Handley Page Heralds by the Austrian Government is reported to be in the final stages of negotiation by the company's Austrian agent. Costing about £400,000, the two Heralds would be operated by a new company formed to administer domestic services in conjunction with Austrian Airlines itself. The Austrian Air Force might also buy Heralds.

**MEXICAN DC-8.**—Under a "mutual jet aid pact" between Eastern Air Lines and Aeronaves de Mexico, the latter company will purchase one DC-8 scheduled for delivery to Eastern in November. It will be used on the New York-Mexico route, on which Eastern is already flying DC-8s.

**JULY TRAFFIC.**—The provisional M.o.A. figures for U.K. airlines' scheduled and I.T. traffic in July shows a 26% increase over July, 1959. The overall load factor fell by 1 point to 64%.

**S.A.A. SPECIALS.**—Prior to the introduction of regular Boeing 707 services on Oct. 1, South African Airways is flying three special services between Johannesburg and London. Leaving Johannesburg on Sept. 14, 21 and 28 at 17.30 hrs. local, these flights are via Brazzaville, Rome and Amsterdam, arriving in London at 08.00 local the next morning. After Oct. 1, all services will be via Salisbury and Nairobi, also serving Athens, Rome, Zurich, Frankfurt and Amsterdam.

**B.E.A.-S.A.S. POOL.**—A new five-year pool agreement between B.E.A. and S.A.S. comes into effect on Nov. 1. From Apr. 1 next year, B.E.A. will use Comets on its routes to Copenhagen, Oslo and Stockholm, but Viscounts will serve Fornebu, Oslo, during the coming winter to avoid the difficult road journey to Gardermoen, the only airport able at present to take the Comet.

**MERGER OPPOSED.**—Eastern and Delta are among the airlines reported to be opposing the proposed Capital-United merger, on the grounds that it "would create a carrier far larger than any that ever before existed" and involves "the likelihood of creating monopoly operations in major markets."

**BELL AWARD FOR B.E.A.**—In recognition of 13 years of helicopter operations, B.E.A. has been awarded the Lawrence D. Bell Helicopter Pioneer Award, which is made to commercial helicopter operators who have been in business at least 10 years. The award was presented to Lord Douglas on Sept. 20 by Gen. John Schweizer, European representative of Bell Aircraft Corp.

**MORE TO AUSTRALIA.**—B.O.A.C. is adding a sixth Comet service on the U.K.-Australia route on Oct. 31, to bring to 11 the total of services on this route by the three pool partners, B.O.A.C., Air India and Qantas.

**S-62 IN SERVICE.**—Los Angeles Airways has taken delivery, on lease from Sikorsky, of an S-62 amphibious turbine helicopter, which will be put into service later this year. Seating 9-12 passengers, the S-62 will be used to obtain turbine experience until the fleet of five 28-seat twin-engined S-61s is delivered next year.

**C.P.A. POOLS SPARES.**—Canadian Pacific Airlines has joined the group of major jet operators pooling spares for the DC-8 and Boeing 707. The airline will provide DC-8 spares pools at Vancouver and two other points on its route network.

**LEEDS SERVICE RESUMED.**—On Oct. 3, B.K.S. Air Transport will resume its scheduled DC-3 service (Mondays to Fridays) between Leeds-Bradford Airport and London Airport. Avro 748s will be introduced on this service next year.

**ANTI-NOISE RULES.**—The F.A.A. rules to reduce noise around New York International Airport (see our issue for Jly. 15, p. 67) will come into effect on Oct. 15. The regulation established an airport traffic area with a 5-mile radius extending up to 2,000 ft.

**ROADAIR TO JERSEY.**—Silver City has introduced a road link between Chelsea and Hurn (Bournemouth) in connection with its Bristol 170 cargo service between Hurn and Jersey.

U.S. NAVY AZTECS.—Piper Aircraft has delivered the first of a number of Aztecs ordered by the U.S. Navy for communications duties. Designated as the UO-1 the Navy Aztec is similar to the civilian model with the exception of radio, oxygen and propeller anti-icing equipment.

**OXYGEN RULES.**—The F.A.A. has proposed a change of rules for the use of oxygen masks on turbine transports. The new rule would require one pilot always to wear and use an oxygen mask above 35,000 ft. (30,000 ft. at present), or above 25,000 ft. if the remainder of the crew do not wear quick-donning masks in the ready position. Above 25,000 ft., if one pilot leaves his station the other will be required to wear his mask until the first pilot returns.

**S.E. ASIA TEAM.**—An ICAO team of experts in aeronautical communication, air traffic services and meteorology has been assigned to the S.E. Asia Region to provide on-the-spot help and advice to states in the area, and to report on measures needed to produce long-term improvements in the existing regional network of air navigation services and facilities.

**DELEGATION TO U.S.S.R.**—Mr. E. R. Quesada, Administrator of the F.A.A., and a nine-man delegation representing the U.S. airline industry, is visiting the U.S.S.R. from Sept. 15 to Oct. 7 as part of the civil air exchange programme between the two nations.

**THE HARD WAY.**—A 17-year-old Portuguese youth who stowed away in the nose-wheel bay of an LAV Super Constellation in the Azores was found, unharmed, after the aircraft landed at Bermuda. His survival was fortuitous, as the Super Constellation happened to make the nine-hour flight at 8,000 ft. instead of the more usual 18,000 ft.

**THE ELECTRA ACCIDENT.**—When an American Airlines Electra, landing at La Guardia on Sept. 14, hit a dyke, overturned and caught fire, the fast and efficient reactions of the two stewardesses and the airport fire fighters combined to avert a major tragedy. While the fire was controlled by foam, all 70 passengers and the crew of six were evacuated in less than two minutes.

**JUNGLE CRASH.**—A World Airways DC-6 operating under lease to MATS crashed shortly after take-off from Guam on Sept. 18, on a flight from Formosa to San Francisco. The 87 passengers included 71 Servicemen and 16 civilians; there was a crew of eight. At the time of going to press, there were known to be 17 survivors.

## *News About People*

**NAPIER EXECUTIVE.**—Mr. P. J. Daglish, B.Sc., M.I.Mech.E., M.I.E.E., A.F.R.Ae.S., has been appointed special executive of D. Napier and Son, Ltd., responsible to the managing director. He joined English Electric in 1946 and prior to joining Napiers was manager of the English Electric Aircraft Equipment Division at Bradford.

**CALTEX CONSULTANT.**—Mr. P. T. Griffith, A.F.R.Ae.S., A.M.I.M.E., has been appointed Aviation Consultant to the Caltex (U.K.) Co., Ltd. Now managing director of the Babb Company (Britain), Ltd., Mr. Griffith was formerly purchasing controller of B.O.A.C.

**ACOUSTICAL APPOINTMENT.**—Dr. R. V. Waterhouse has been appointed managing director of Acoustical Investigation and Research Organization, Ltd., of 118 Cromwell Road, London, S.W.7—known as AIRO; this is a member of the Hall-Thermotank Group. For the past eight years Dr. Waterhouse has been with the National Bureau of Standards in Washington, in charge of the Architectural Acoustics programme.

**OVERSEAS APPOINTMENTS.**—Mr. L. W. Hopkins has been appointed general manager of Overseas Aviation (C.I.), Ltd. Other appointments which took effect on Sept. 1 are those of Mr. J. C. Chamberlain as sales manager, Mr. A. Fleming as sales manager (Manchester) and Mr. J. Hughes as assistant sales manager (London).

**D.H. AUSTRALIA.**—Mr. Ken Oram has been appointed manager of the newly created general aviation department at de Havilland Aircraft, Bankstown. This department will control civil aircraft sales, servicing and spares requirements for the Beechcraft range as well as for de Havilland Doves, Beavers and Otters.

**TO WASHINGTON.**—W. K. Ebel, vice-president in charge of engineering of Canadair, Ltd., Montreal, for the past 11 years, has been transferred to the Washington office of the parent corporation, General Dynamics. In his new assignment as a staff executive he will assist the corporation's senior vice-president for engineering, L. B. Richardson, in co-ordinating engineering activities in all units of Dynamics, including Convair, Electric Boat, Stromberg Carlson and General Atomic.

**BACK TO BUENOS AIRES.**—Mr. E. W. Metcalfe, who has been senior operations representative in Europe for Argentine Airlines for the past two years, has now returned to Buenos Aires to take up his appointment as director of operations in the company's head office.

**MARCONI APPOINTMENT.**—Dr. T. W. Straker, M.Sc., Ph.D., has been appointed deputy manager of the Marconi company's Radar Division, of which Mr. E. N. Elford, O.B.E., A.M.I.E.E., is manager. Since 1959 Dr. Straker has been chief of the projects co-ordination group of the research division at the Marconi Research and Development Laboratories, Great Baddow.

**AUSTRALIAN RETIREMENT.**—Mr. John Byrne has retired from the board of de Havilland Aircraft Pty., Ltd., after more than 30 years' service. He joined the company from the R.A.A.F. in 1930.

# Correspondence

## Overweight Ultra Lights

WITHOUT knowing the accepted definition of an ultra-light aircraft* I start at a slight disadvantage. The point I wish to make is that I consider it somewhat nauseating to refer to a flying machine equipped with a 60 h.p./70 h.p. engine as "ultra light." Surely this is merely a "light aircraft"?

As one who is interested in manpowered flight I look forward to seeing a truly ultra-light aircraft with an engine, or engines, developing no more than a total of about 5 h.p. The successful design and construction of such an aircraft will cover many of the problems incorporated in a manpowered machine.

By gradually decreasing the effective horse-power (down to a figure of about one and a half) while simultaneously increasing the general aerodynamic efficiency of the airframe we will arrive at the happy position of being able to sling out the engine, or engines, and get the pilot, or pilots, to do all the driving.

J. CRAMPTON
(Sqn. Ldr., R.A.F., D.F.C., A.F.C.).

East Horsley, Surrey.

[* Any aeroplane below 1,200 lb. all-up weight and of 75 h.p. or less, according to the Popular Flying Association.—ED.]

## Making Use of Gatwick

IN "The Tight Little Island" (THE AEROPLANE AND ASTRONAUTICS, Sept. 9, p. 344) you say, with regard to taking more traffic from L.A.P. to Gatwick, that B.E.A. can't be expected to go it alone to Gatwick while other operators use L.A.P. But why *should* B.E.A. go to Gatwick at all when their engineering base is at L.A.P.?

In France, Air France has its engineering base at Orly and operates its services from there while most foreign lines, including B.E.A., have to operate from Le Bourget. So the obvious thing to do in England is to tell foreign operators, at any rate short-haul operators, they must use Gatwick and vacate L.A.P. B.E.A.'s objection to going to Gatwick is that they have many passengers requiring to transfer to long-haul lines but that would not, or should not, affect the short-haul foreign airlines.

There could be no complaint from foreign lines for Gatwick is so much more convenient and accessible for passengers who walk straight from the railway platform into the airport concourse. And the train journey between Victoria and Gatwick is far more comfortable and safe, and much quicker than from Cromwell Road to L.A.P.

London, W.14. GEOFFREY DORMAN.

## Kingsford-Smith's Jubilee Flight

RECENT correspondence in your columns, starting from Dec. 11, 1959, regarding the Jubilee Flight of Kingsford-Smith from Australia to New Zealand in 1935, prompts me to send you a few more details of that flight.

The Jubilee Flight was designed to promote interest in regular Air Mail flights between the two countries.

Contrary to H. F. Cowley (Dec. 25), it was the starboard propeller which was damaged, and prior to the transfer of the oil from the starboard to the port engine, an attempt was made by Taylor to cut off part of the opposite end of the damaged propeller with a hacksaw so that the engine could be run at low power and thus reduce the drag caused by the stationary propeller.

The majority of the mail was kept aboard until the last moment when the port engine showed signs of failing. With the lighter load the engine power was reduced slightly thus easing the strain and enabling the plane to be kept airborne long enough to reach land.

When the port oil pressure gauge started flickering, Taylor climbed out to the starboard engine and, using a vacuum flask, drew off some oil which he passed to Stannage the wireless operator who put it into a kitbag until they had approximately one gallon. Taylor then climbed back into the plane and out to the port engine when the oil was poured into the engine.

Power had to be reduced each time the oil was passed out to Taylor because of the air pressure blowing the oil away. This feat was repeated several times during the flight home so that the engine could be kept running, until finally the plane reached Mascot and landed.

Kingsford-Smith offered to take the remaining mail bags across to New Zealand the next day in "Faith in Australia" but the Post Office refused to allow him to go.

P. G. (now Sir Gordon) Taylor described the epic flight in detail in his book "Call to the Winds" which was published by Angus and Robertson in 1939. There are a number of photographs in the book showing the damage to the various components.

Incidentally, when the "Southern Cross" was being made ready for the film "Smithy," the R.A.A.F. fitters who worked on the engines found a small piece of a vacuum flask in the oil tank of the port engine. This piece of flask is now kept in the R.A.A.F. Museum at Point Cook.

Point Cook, Australia. R. H. DAVIDSON,
Warrant Officer,
Curator, R.A.A.F. Museum.

## Groundabout

### Farnborough Hangover

General opinion: Not many new aeroplanes but plenty of new jokes, a pointer to the show's goodwill value and therefore sales value. And the mighty international Press still think it worth while to come in their hundreds from America, Europe and places with strange-sounding names.

*

We aeronautical lot consider ourselves a race apart, and perhaps we are. One of a small group of Americans who came over together said "We were the only people on the plane—all the rest were lawyers and bankers."

*

In the Press Tent: "How did *he* get in? He's a genuine phoney."

*

I liked Oliver Stewart's amusing, though quite valid, comment that the Dove 8's ejector exhausts provided "a useful increment." Visions of a D.H. brochure statement: "Price includes useful increment. . . ."

*

I wonder if the R.A.F. is first with the idea, so elementary that it's practically primitive, of starting bombers' engines all at once instead of one at a time? If so, then that rare award, Wren's Commendation, goes to the genius who thought of it, and another one, with Gold Chain, to the engineers who made it work.

*

It was at the R.A.F. Institute of Medicine, just across the road from the S.B.A.C.'s "Big Top" Exhibition, that the Press were recently introduced to that aid to desert survival, Libyan snail-juice, and Alan Tomkins, venerable Fleet Street journalist, thinks that an insidious trend has been set afoot. Shortly after that repulsive demonstration, he visited a Bomber Command station and found "Savoury Mice Roll" on the menu. (In case you're as dim as old Wren, the Mess typist had left an "n" out of the vital word.)

*

Depicted herewith is a scene I damply witnessed on Filthy Tuesday. It seemed so typical of our wretched climate and the Farnborough spirit. In any conditions, we strain to sell. Roll on the next Display, whatever its form.

*

**The Pence and the Independents.** When you're working to the nearest farthing you have to put first things first. A friend who returned from a European holiday on a cheap tourist flight says that the cabin crew attended to duty-free cigarettes, drinks, and the meal—in that order.

by Wren

# Industry Record

### Airstream Direction Detectors

Ferranti, Ltd., have received a £25,000 contract for their new airstream direction detector system which will be fitted as standard equipment to all Scimitars, Sea Vixens and Buccaneers of the Fleet Air Arm. This is the direct result of trials with a prototype system on the carrier "Victorious" last year.

The system, which has taken two years to develop in collaboration with Specialities Inc., in America, who had the basic idea, provides the pilot with continuous angle-of-attack information. It enables an aircraft to be flown on the best part of the lift/drag curve to maintain economic flight conditions, maximum climb-away and minimum take-off and approach speeds.

It has been flown up to Mach 2.34 with no discontinuities or irregularities, and wind-tunnel tests have proved satisfactory up to Mach 4. Basically, it comprises a sensing probe, a head-down indicator and an approach aid.

The probe, mounted on the side of the aircraft, in front of the wing, senses the local airflow which is a linear function of the angle of attack. The head-down indicator gives the pilot continuous indication of angle of attack, in all phases of flight, while the approach aid provides him with a head-up audio and visual indication.

### Lightweight Oxygen Regulator

A new lightweight, large-capacity regulator for the emergency oxygen systems of turbojet and turboprop aircraft has been developed by the Pioneer Central division of The Bendix Corporation. Units are being installed in Canadair CL-44 transports for the R.C.A.F., and Boeing have also approved the installation of the regulator in the 707.

Capable of controlling all passenger-supply outlets for 100 passengers at altitudes up to 41,000 ft., the regulator weighs 14 oz. It has an operating temperature range of −65°F. to 160°F. and a flow range of 0-450 litres per min. at standard temperatures.

Components of the new Ferranti airstream direction detector system. 1, probe cover; 2, probe unit; 3, servo generator; 4, head down display; 5, head up indicator light box; 6, controller.

## PUBLICATIONS RECEIVED

**The Hero,** Charles A. Lindbergh—The Man and the Legend. By Kenneth S. Davis. An important biography of one of the most famous of all American aviators, first published in the U.S. last year and now republished here without the original 81-page Bibliographical Essay in which the author discussed and commented upon the sources of his information. 446 pp.; 6 in. by 9 in. Illustrated. Longmans, Green and Co., Ltd. Price 30s.

**The Young Scientist.** Edited by W. Abbott. Twenty chapters, for readers between 13 and 19 years of age, include seven of aviation interest—covering VTOL, high-speed flight, space rockets, flying the Comet, inertial navigation, the Boeing 707 and ice protection for aircraft. 320 pp.; 5¼ in. by 8 in. Illustrated. Chatto and Windus, Ltd. Price 16s.

**Radio Aids to Civil Aviation.** Edited by R. F. Hansford. Fourteen authors contribute to this important book which should become the standard work of reference for all concerned with the planning, installation and operation of aviation radio on the ground and in the air. 642 pp.; 6½ in. by 10 in. Illustrated. Heywood and Co., Ltd. Price 6 guineas.

**Britain's Imperial Air Routes, 1918 to 1939.** By Dr. Robin Higham. An interpretative study of the growth of British civil air transport, covering the "pre-subsidy" period from 1910, the beginning of subsidized operations, the formation of Imperial Airways and, more briefly, the emergence of British Airways and B.O.A.C. The author, a lecturer in the University of North Carolina Department of History, has had access to much hitherto unpublished material. 308 pp.; 5½ in. by 8¾ in. Illustrated. G. T. Foulis and Co., Ltd. Price 42s.

**The Sky Suspended.** By Drew Middleton. A nicely objective account of the Battle of Britain, describing the course of events from May, 1940, to April, 1941. The author, who was London correspondent for the U.S. Associated Press at the time of the Battle, evokes the spirit of the times without recourse to unnecessary detail. 256 pp.; 5¼ in. by 8 in. Martin Secker and Warburg, Ltd. Price 16s.

**Bristol Fashion.** By John Pudney. The history of the Bristol Aeroplane Company's first 25 years related in terms of the men who made the company great. 106 pp.; 5¼ in. by 9 in. Illustrated by David Gentleman. Putnam. Price 12s. 6d.

## Aviation Calendar

**Sept. 25**

**Dunstable Downs.**—National Aerobatic Contest organized by the London Gliding Club at 11.00 hr.

**Sept. 27**

**London.**—The Institution of Mechanical Engineers Symposium on Automatic Control; until Sept. 28.

**Sept. 28**

**London.**—Society of Environmental Engineers lecture, "The Development and Testing of Small Electronic Components," at Imperial College, S.W.7, at 18.00 hr.

**London.**—Northampton College of Advanced Technology start of 1960-61 session of post-graduate lectures in Aeronautical Engineering, at the College, St. John Street, E.C.1. Full details can be obtained from the College.

**Oct. 3**

**Istanbul.**—AGARD 16th meeting of the Aero Space Panel; until Oct. 8.

**Istanbul.**—AGARD 4th Avionics Panel Symposium on "Radio Navigation"; until Oct. 9.

**Oct. 6**

**Istanbul.**—Tenth AGARD General Assembly; until Oct. 7.

**Bristol.**—British Institution of Radio Engineers convention on "Aviation Electronics and its Industrial Applications," at College of Science and Technology, Ashley Down Road; until Oct. 7.

**Oct. 11**

**Folkestone.**—Aerodrome Owners Association Annual Conference, at the Grand Hotel; until Oct. 12.

**Oct. 12**

**Brighton.**—Institution of Production Engineers Conference on "Modern Trends in the Manipulation of Metals"; until Oct. 14.

**Oct. 18**

**Bournemouth.**—Guild of Air Traffic Control Officers 3rd Air Traffic Control Convention at the Town Hall; until Oct. 19.

**Oct. 19**

**Southend.**—R.Ae.S. Branch Lecture, "Rocket Engines," by L. S. Snell, in Room 3, Engineering Dept., Municipal College, London Road, at 19.30 hr.

## Company Notices

### NEW COMPANIES

**CUSHION TRANSPORT, LTD.** (668,822).—Private Co. Reg. Aug. 30. Cap. £100 in 1s. shs. Proprietors and operators of all forms of aircraft, etc. Directors: Herbert W. Sydenham, Chartered Accountant, and John B. Sweeney, both of 27 Martin Lane, London, E.C.4.

**AIROFRAMES, LTD.** (668,901).—Private Co. Reg. Aug 31. Cap. £100 in £1 shs. Aerial photographers, etc. Directors: Mrs. Daphne E. K. Maycock, Dove Cottage, Farnham Lane, Haslemere, Surrey, and Leslie M. T. Bell, 55 Woodbury Avenue, Petersfield, Hants. Sec.: Daphne E. K. Maycock. Reg. off. 1 West Street, Woking, Surrey.

### INCREASES OF CAPITAL

**British Eagle International Airways, Ltd.** (561,051).—12 Low Pavement, Nottingham. Increased on Feb. 18, 1960, by £997,400, in £1 ordinary shares, beyond the registered capital of £2,600. The 1s. ordinary shares have been consolidated into £1 ordinary shares.

## New Patents

### APPLICATIONS ACCEPTED

852,091.—**National Research Council**—"Crash position indicator for aircraft." Mar. 26, 1957. (Apr. 4, 1956.)

852,092.—**National Research Council.**—"Quick-release mechanism." May 1, 1958. (Aug. 12, 1957.)

852,115.—**Bell Aircraft Corporation.**—"Helicopter metal main rotor blade." May 15, 1957. (May 15, 1956.)

852,243.—**Vyzkumny A Zkusebni Letcky Ustav.**—"Rotor hub for rotorcraft." Feb. 8, 1957.

Printed specifications of the above will be available on Oct. 26, 1960, and the opposition period will expire on Jan. 26, 1961.

852,858.—**Curtiss-Wright Corporation.**—"Propeller-synchronizing simulating systems."—Jan. 30, 1950. (Feb. 13, 1958.)

853,034.—**Smith and Sons (England), Ltd.**—"Visual indicators."—Sept. 5, 1958. (Sept. 17, 1957). (Cognate application 33451, Oct. 25, 1957.)

852,881.—**Vickers-Armstrongs (Aircraft), Ltd.**—"Aeroplanes and other flying bodies."—Sept. 6, 1955. (Sept. 10, 1954.)

852,841.—**Westland Aircraft, Ltd.**—"Rotary wing aircraft."—Mar. 5, 1959. (Dec. 10, 1957.)

852,829.—**Rolls-Royce, Ltd.**—"Gas turbine jet propulsion engines."—Apr. 2, 1958. (Apr. 3, 1957.)

Printed specifications of the above will be available on Nov. 2, 1960, and the opposition period will expire on Feb. 2, 1961.

## Personal Notices

### BIRTHS

**Beech.**—On Sept. 4, at R.A.F. Hospital, Ely, to Joyce (*née* Meaden), wife of Flt. Lt. J. D. Beech—a son.

**Broad.**—On Sept. 7, at R.A.F. Hospital, Changi, Singapore, to Wendy (*née* Gammon), wife of Flt. Lt. M. H. D. Broad—a son.

**Cornell.**—On Aug. 31, to Maritta, wife of Sqn. Ldr P. E. Cornell—a son.

**Earland.**—On Sept. 1, at The Warren, Abingdon, to Daphne (*née* Halse), wife of Flt. Lt. J. M. Earland—a daughter.

**Watts.**—On Sept. 5, at R.A.F. St. Athan Hospital, to Doreen Anne (*née* Davis), wife of Flt. Lt. J. R. Watts—a daughter.

**Widmer.**—On Sept. 6, at Belmont Nursing Home, Westgate-on-Sea, to Sophie, wife of Flt. Lt. J. Widmer—a son.

**Wright**—On Sept. 3, at Mill Road Maternity Hospital, Cambridge, to Anne (*née* Hart), wife of Sqn. Ldr. David Wright—a son.

### DEATH

**Davey.**—On September 7, at R.A.F. Melksham, Gp. Capt. James Leslie Davey.

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. . . but beneath the
radar net there is
a vulnerable gap
which is exploited by
the BUCCANEER
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strike aircraft
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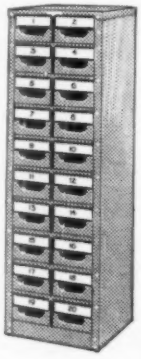

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**Luton Airport, Beds.**

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**PRESS DAY: Classified Advertisements must normally be received at Head Office by FIRST POST THURSDAY for the following Friday week's issue. Last-minute additions and deletions are accepted by telephone from trade advertisers up to noon. Advertisements received too late for a particular issue are automatically inserted in the succeeding one unless instructions to the contrary are received.**

**RATES**—1/- per word (minimum 12 words 12/-). Each paragraph charged separately and name and address must be paid for. Semi-displayed setting £3-17-7 per single column inch. Centred lines 22/6. Series discounts of 5% for 13, 10% for 26 and 15% for 52 consecutive insertions allowed to trade advertisers.

**TERMS**—Strictly net and prepayable. Monthly accounts for settlement by the end of the month following insertion are allowed to trade advertisers if satisfactory references are provided.

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**BOX NUMBERS**—Private advertisers desiring to have replies sent care of "The Aeroplane and Astronautics," may do so on payment of 1/- to cover booking and postage, plus cost of four extra words. Box Numbers must not be used for the purpose of circularizing and the Proprietors do not undertake the distribution of such matter received. To avoid mistakes in forwarding, Box Numbers should be carefully and legibly copied and replies sent to Box A000, care of "The Aeroplane and Astronautics," Bowling Green Lane, London, E.C.1.

**THE PROPRIETORS** retain the right to refuse or withdraw advertisements at their discretion and are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

**HEAD OFFICES:** Bowling Green Lane, London, E.C.1, England. Telephone: Terminus 3636. Telegrams: "Pressimus London Telex." Telex: 23839.

**BRANCH OFFICES:** Bayliss House, Hurst Street, Birmingham, 5. Telephone: Midland 6616. 50 Hertford Street, Coventry. Telephone: Coventry 27414. 1 Brazennose Street, Manchester. Telephone: Deansgate 6114–8. 12 Renfield Street, Glasgow. Telephone: Glasgow Central 1413.

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WITH the introduction of G-ARBY Viscount into their service, Maitland Drewery are prepared to offer for sale or lease one of their Viking aircraft. Inquiries to 128 Station Rd., Sidcup, Kent. 563-9071

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DAKOTA aircraft (C47-DC3) for sale. Details from Astraeus, Ltd., 167 Victoria St., London, S.W.1. Phone, Victoria 1403. Cable, Arreffay, London. 553-6

PIPER Apache, 1957 model, fully equipped, radio, A.D.F., automatic pilot I.L. S., M.F., marker beacon receiver, red and black, zero hours, engines and propellers, immediate delivery £11,250. Duty paid. LONDON AERO CLUB, Panshanger Aerodrome, Hertford. Essendon 305. 553-9

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## NOTICES

### AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM OVERSEAS AVIATION (C.I.), LTD., OF 6 YORK STREET, ST. HELIER, JERSEY, C.I., unless otherwise stated, for seasonal U.K. Internal Services, initially with Viking aircraft and later also with Heron and Ambassador aircraft, for the carriage of passengers and supplementary freight, at an initial frequency of three return flights weekly on each service, increasing later in accordance with traffic demand, from May to October each year, for seven years from the date of approval:—

APPLICATION NO. 4479 on the route Northampton (Sywell)-Liverpool-Belfast.

APPLICATION NO. 4480 between Northampton (Sywell) and Isle of Man (Ronaldsway).

APPLICATION NO. 4481 to be operated throughout the year between Northampton (Sywell) and Glasgow.

APPLICATION NO. 4482 between Northampton (Sywell) and Jersey.

APPLICATION NO. 4483 for a Normal Scheduled Service between Northampton (Sywell) and Ostend.

APPLICATION NO. 4484 to be operated throughout the year between Northampton (Sywell) and Bristol.

FROM DAN-AIR SERVICES, LTD., OF 36-38 NEW BROAD STREET, LONDON, E.C.2.

APPLICATION NO. 3393/1 for an amendment to the terms of approval of the U.K. Internal Service which they are authorized to operate with Dove aircraft, on the route Plymouth and/or Bristol-London (Gatwick) at a frequency of two return flights weekly, until April, 1967, so as to enable them to operate at an increased frequency of seven return flights weekly from January 1, 1961, and to include a technical stop at Exeter for the purpose of transferring two restricted Dove loads of passengers from Plymouth into a single Dove aircraft for onward carriage to London (Gatwick).

APPLICATION NO. 3202/3 for an amendment to the terms of approval of the seasonal U.K. Internal Service which they are authorized to operate with Dove, Dakota and Bristol 170 aircraft on the route Bristol and/or Cardiff-Isle of Man, at a frequency of seven return flights weekly from April to October each year until October 31, 1966, so as to enable them to operate on the amended route Exeter and/or Bristol and/or Cardiff-Isle of Man.

FROM CUNARD EAGLE AIRWAYS, LTD., OF 40 EDGWARE ROAD, LONDON, W.2:—

APPLICATION NO. 13771/2 for permission to include an optional traffic stop at Edinburgh, on the Normal Scheduled Service which they are permitted to operate with Viking and Viscount aircraft, on the route Manchester (Ringway)-Stavanger (opt)-Bergen and/or Oslo, at a frequency of seven return flights weekly until October, 1964.

Application No. 3153/1 for permission to operate at an increased frequency of three return flights weekly with Viscount aircraft (or equivalent capacity with Viking and DC6C aircraft), on the seasonal Normal Scheduled Service which they are at present authorized to operate between London and Perpignan, at a frequency of two return flights weekly with Viking aircraft or one return flight weekly with Viscount or DC6C aircraft, from April to October during 1960 and 1961.

FROM B.K.S. AIR TRANSPORT, LTD., OF BERK HOUSE, BAKER STREET, LONDON, W.1:—

APPLICATION No. 780/2 for an amendment to the terms of approval of the Normal Scheduled Service which they are authorized to operate with Dakota, Ambassador and Bristol 170 aircraft, between Southend and Lille at a frequency in accordance with traffic demand until May 31, 1963, so as to enable them to operate on the amended route London Airport and/or Southend-Lille.

These applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30, 1952. Any representations or objection with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 3 Dean's Yard, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. 553-15


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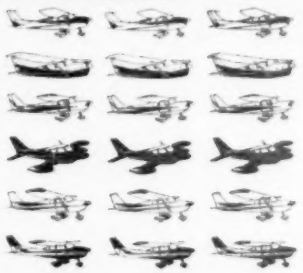

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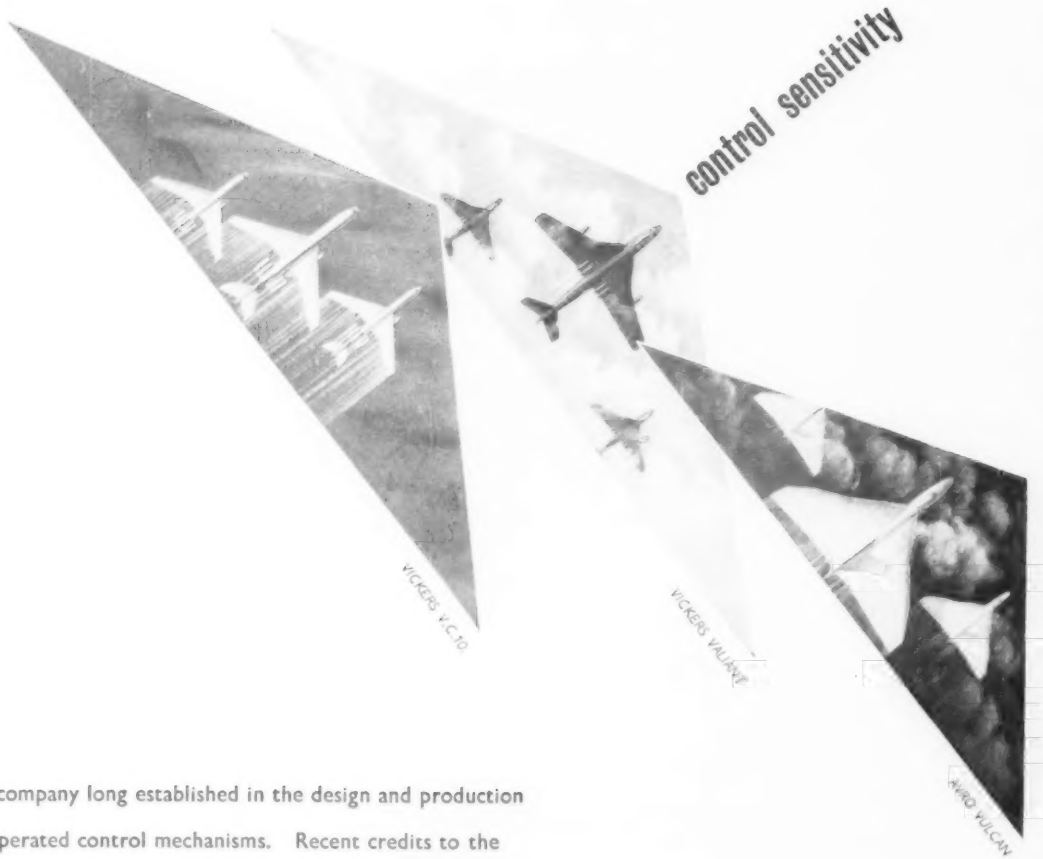


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